THE IRON AGE

May 28, 1931

Wage Rates in Steel Industry	1723
Drafting Room Production Control	1726
Making Carbon Steel Castings	1732
Use of Gas Trucks and Tractors	1734
Function of Research at Armco	1736
Strength of Spur Gear Teeth	1742
Control of Open-Hearth Combustion	1749
Dr. Haney's Page	1777

New Equipment	1753
News	1759
Personals and Obituaries	1774
Editorials	1778
Markets	1781
Construction and Equipment Buying	1802

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American Gear Manufacturers' Association
New England Council
National Industrial Congress
American Society for Steel Treating
National Metal Trades Association
Triple Convention of Mill Supply and Machinery Distributers
American Welding Society
American Society of Mechanical Engineers

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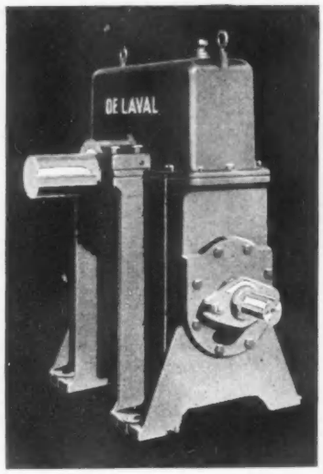
76th IRON AGE YEAR



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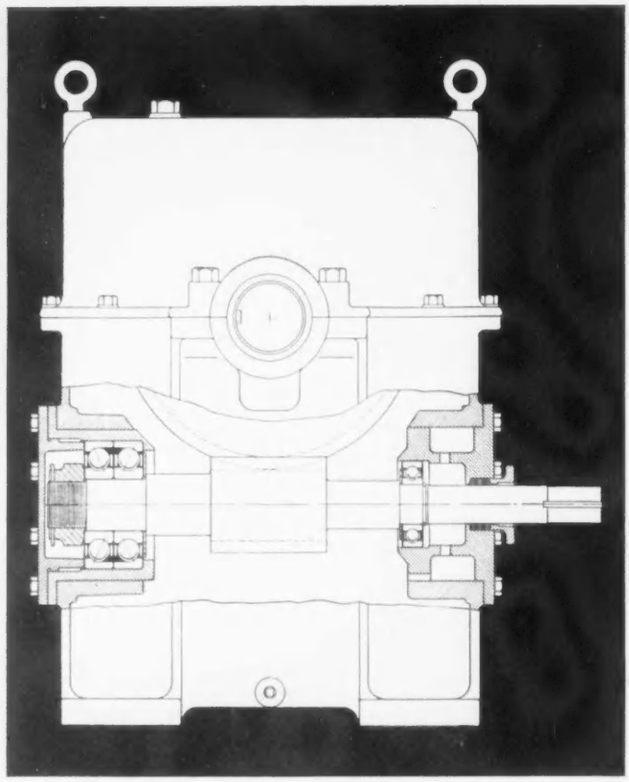

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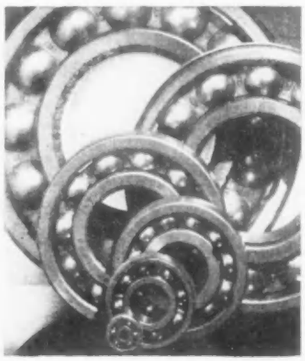

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NEW DEPARTURE BALL BEARINGS

1744

THIS ISSUE IN BRIEF

MAY 28, 1931

Drafting Costs Cut in Half

Draftsmen are grouped into small squads of from one to five men, in charge of a squad leader, who is a qualified designer. Each man checks his own work. Each drawing, after completion, is given a "par-hour" rating by the production supervisor.—Page 1727.

* * *

Which Shall It Be: Electric, Gasoline or Hand Industrial Truck?

Each kind of equipment has its advantages and disadvantages. Cost data are inadequate. Expense factors vary so widely that a comparative cost summary is difficult to prepare. One table gives the yearly operating cost of a gasoline truck or tractor as $2,943, including operator's pay.—Page 1734.

* * *

"Trade Secrets" No Longer Provide Security

Competition in improved products and processes for their manufacture can be met only by means of organized research.—Page 1737.

* * *

To Avoid Excessive Wear in Moving Parts

The maximum dynamic loads on moving parts of a mechanism are impact loads, their intensity being the sum of the transmitted load and an increment load. The stresses set up by these impacts must not exceed the compressive fatigue limits of the materials employed if excessive wear is to be avoided.—Page 1743.

* * *

Calculating Breaking and Surface Stresses of Spur Gear Teeth

Extensive research reveals that increment loads due to shocks caused by inaccuracies of tooth form or spacing are not proportional to transmitted loads, as previously supposed, but are proportional to the extent of the error in the gear teeth.—Page 1742.

* * *

"Error Record" Makes Draftsmen More Accurate

Each draftsman is informed every month of his production ratios and the errors affecting his drawings. He is given his own standing and the maximum, minimum and average figures of his division.—Page 1728.

* * *

Depression Due to Fear and Maladjustments

The depression is due both to fear and to necessary economic readjustments. Wholesale prices have been liquidated and latterly proportionate adjustments in retail prices have been taking place.—Page 1723.

Avoiding Porosity in Acid Electric Steel

Preparations in the form of surface treatments to counteract the influence of moisture in green sand molds did not produce especially promising results in tests. Controlling moisture and permeability of the sand permits the use of a minimum of deoxidizer, resulting in higher ductility.—Page 1733.

* * *

Power-Driven Industrial Trucks Do Work of Two to Ten Men

According to estimates, 80 per cent of the installations replace manual labor methods, and 20 per cent some other form of mechanical handling equipment.—Page 1735.

* * *

Research Is No Sub-Department Here

The research department in a well-known steel company is one of the four major groups reporting directly to the management.—Page 1738.

* * *

Drafting Production Controlled by Periodical Survey

Survey shows the work on hand. Against each individual is allotted an estimated time necessary to complete his drawings. The time, plotted in days, is then incorporated on a log sheet. Too much disparity in amount of work among squads is overcome by transferring work, assigning new work to squads not fully occupied, or transferring individuals.—Page 1730.

* * *

Add at Least Part of "Deoxidizer" Before Pouring

Gases evolved by green sand molds make it advisable to have a sufficient amount of aluminum in the acid electric steel at the time of pouring.—Page 1732.

* * *

Opposes Wage Cuts

Labor costs in the steel industry can be, and have been, liquidated without taking it out of the wage rate of the mill employee, says Charles M. Schwab.—Page 1723.

* * *

Monolithic Ladle Lining Lasts Longer

Monolithic surface is put on steel foundry ladles by hand or by cement gun. It is said to be easily repaired when damaged and lasts longer than ordinary brick lining.—Page 1749.

▲ ▲ ▲

NEXT WEEK

▼ ▼ ▼

CHROMIUM plating has been widely used to increase corrosion resistance or to improve the appearance of products. A large American manufacturing company has found an additional advantage. It applies chromium to metal surfaces to obtain increased resistance to abrasive wear. The chromium plate is applied directly to the metal from which a given product is to be made, no undercoat of copper or nickel being used. Details of the process will be presented in the issue of next week.

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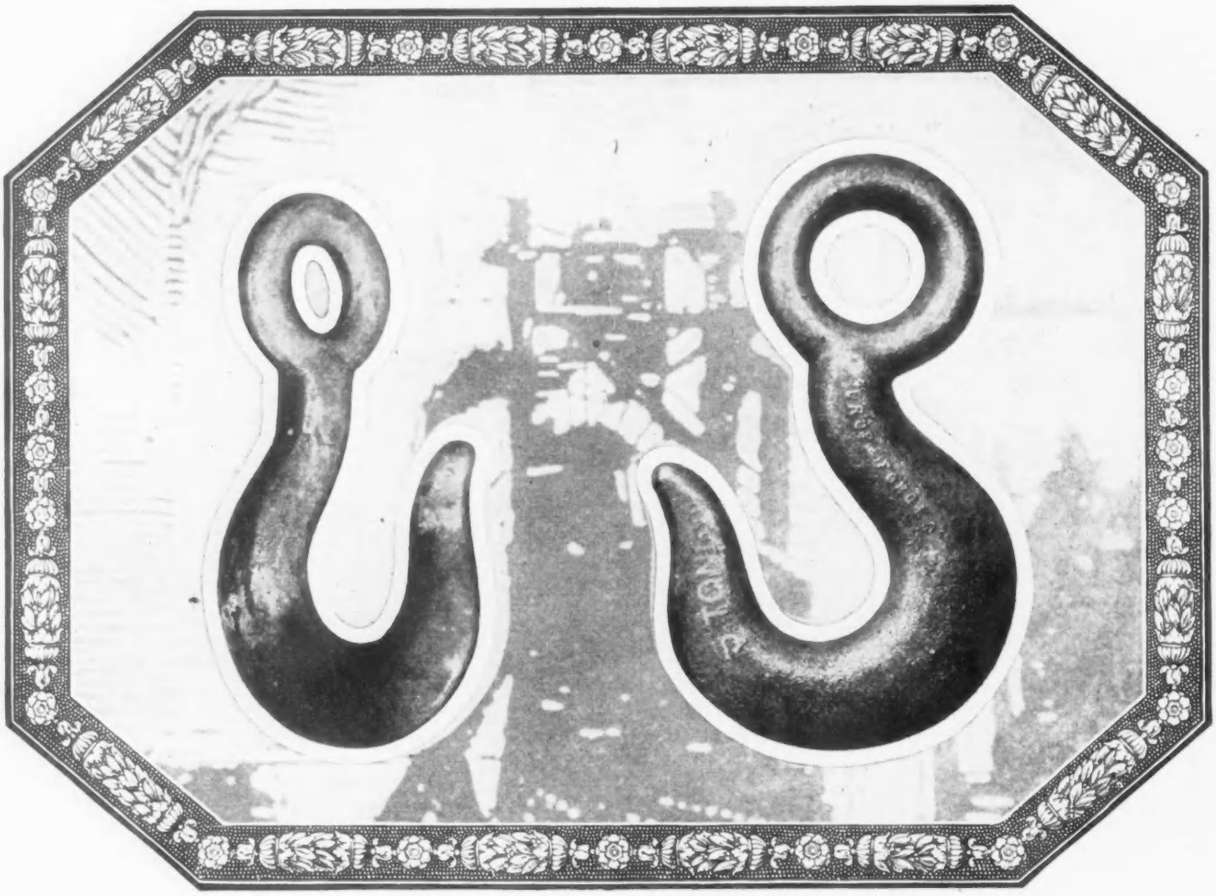

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..THE IRON AGE..

New York, May 28, 1931

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ENGINEERING SOCIETIES LIBRARY MAY 28 1931

PRICE SLASHES MEAN RUIN— WAGE CUTS UNFAIR TO PART-TIME WORKERS

By JAMES A. FARRELL

James A. Farrell

WE have ourselves to blame in the steel industry for our condition. All sorts of comments have been made by people who do not understand it. Scarcely a day passes that we do not hear about the high tariff wall in the steel industry. Why, the stones are still nestling in the mountains to build the foundation for that wall; they have never been quarried. The average duty on iron and steel would not bring the steel from New York to Lancaster, Pa.

Some learned economists and others always get down to one thing, and that is to cut the 50c. an hour fellow. If all the men in this room that are receiving $5 a day would stand up you could still see over the horizon of this mass of people. We talk about the man receiving $5 a day or $4.80. And yesterday in one place where a man was getting $5 a day, tomorrow he is getting $4.40.

When it is said, Mr. President, that wages have been stabilized in the industry—they have not. We are living in a fool's paradise if we think that every steel manufacturer in the United States has maintained what is generally known as the current rates of wages. It has not been done. There has been honeycombing and pinching and that sort of thing. And even among the most talked of companies, the so-called big companies, the companies in the headlines now and then, they do not pay the standard rate of wages when it comes to the rate per hour.

Now what we are trying to do is to separate the wheat from the chaff. And I am not going to mention the names of all of the companies in this room that have cut wages; I do not want to embarrass them; but I think it is a pretty cheap sort of a business when the largest industries in the country are trying to maintain a stable rate of wages for men who are working three days a week, and then cut that three days a week another 10 per cent. Now that is not Mr. Schwab's idea, it is not our idea, it is not the idea of the old line companies.

Mr. Schwab has referred this morning to the question of panics. I can remember as a boy, and so can he, when we got our wages on a slip of paper, and if we could get something at the store we were lucky. Nobody talks about stabilization of salaries. It is always the man in the mill or the

man in the mine. I would not have wanted you to accompany me on a little trip through the coal country recently. Thank God there was no destitution at the mines of the company that employs me. But of all the squalor and all the misery that I have ever witnessed, in some of the mines in West Virginia and in the eastern part of Kentucky, it beggars description.

We talk about the wages of the working man. I talked to a miner at a little railroad station who had trudged three miles from the mines with his lamp in his cap; and he asked me for a match; I gave him a match and I gave him some tobacco, too—probably a little better than he had been accustomed to. I said to him: "Where do you work?" He mentioned the name of a company that has a high reputation. We have heard all this talk about this being the cultural age and about paying cultural wages, but when a working man in the mills or mines has nothing to do, he is interested in materialism.

All these economies that Mr. Schwab has referred to have been pretty generally done in nearly all companies. We have been searching here and there, and we have been scanning numerous items, traveling expenses, entertainment. I told the purchasing agent of one of our companies the other day that if he bought another stick of furniture in 1931 I want to know the reason why. We only spend a half a million dollars a year, Mr. Schwab, in the Steel Corporation, in giving a man a more comfortable chair with a nicer desk. (Laughter.)

But those economies are necessary. Why? Because certain elements in the steel industry and certain elements in the steel buying industry have practically ruined prices. Gentlemen, do you know that within two years the price of automobile body sheets has been reduced $23 a ton—I think $24 a ton? You cannot get the raw material at this figure. There is not a single line in the steel business today, in my opinion, where there is an adequate cost return on the finished materials.

A man said to me the other day: "Well, rails have not been reduced." I happened to have in my office—having rather anticipated some question being asked sooner or later—14 lb. of a new section of rail—132-lb. rail, by the way—and I checked this piece of steel up. In the first place we had paid eight freights on the constituents that went into the steel. In the second place, there was 35 per cent discard. The next thing, more alloys—more manganese, more silicon. And finally the rail is put in the track and a Sperry magnetic detector is run over the rail, and if there is a sliver in that rail that magnetic detector stops, and out goes the rail and another one is given the railroad.

I wonder why rail manufacturers ever sold rails at dollars per ton. When we talk about a barrel of flour at $5 it sounds large; if you talk about a rail at $43 a ton it sounds large. But the price of rails that are being used today should be $49 a ton. Because there is nothing left to cover cost. Taking 14 lb. of rail, and figuring it out on a basis of cents per pound, what do we get for it? We get the equivalent of these two Connecticut cigars. This is my favorite brand, too. I am not going to advertise the brand.

But coming back to the real reason that 14 lb. of rail, a Tiffany production, a perfect piece of steel that is expected to last—now they are supposed to last 30 years in the track—the 14 lb. of rail worked out 24.8c., and these cigars work out two for a quarter. (Laughter.)

I live in the country where these are grown and all we do is to raise the leaf and roll it up, and they sell for two for a quarter. Now that may sound funny. But there is a tragedy behind this whole business. We are wasting millions of tons of raw material and getting no return for it. We are no longer sellers of steel; the large industries tell us what they will pay. Our commodities are sold at too low a price.

We have fallen on parlous times in the steel industry. We read editorials in the press about the tariff on iron and steel, and then we hear what numerous people say, that there will be no return to prosperity until wages are reduced. You go to those newspaper people and you want to advertise; you will find that you are paying as much if not more for your advertising as you have paid for a long time. Deflation is always considered necessary in some places and not necessary in others.

Now I say about steel that it is a fact today that manufacturers of steel do not sell their product. We used to negotiate a transaction, we used to have the opportunity of trading, so to speak. Well, one of our men or any of us will walk into the office of a company—this happened two days ago; a concern wanted to buy 2000 tons of wide strip; I am not talking about bacon now, I am talking about steel (laughter)—and this buyer seemed to be highly elated. He acted as though he was indulging in some sort of ghoulish glee of some kind. Well, he said: "One of your competitors has just been in here and offered me this material at 1.40c., delivered." Of course that was a cut of $2 a ton. And in this inferential way—and you know what the inferential way is, you are not told who does these things but you know—with the precise shrug of the shoulders and that knowing look of the buyer, he tries to create the impression, and he does in most instances, that he is buying under the market, that he is a supernatural man, that he knows more than anybody else. Down goes the market. Now everybody here in the steel business knows that you cannot make hot-rolled strips and pay $4 a ton freight on them and make anything other than a loss of about $4. So what has happened?

A FORCEFUL, candid address by President Farrell of the United States Steel Corpn. before the American Iron and Steel Institute in New York, May 22, jolted the steel industry into a realization of its critical condition.

Recalling that a year ago he had forecast that most companies would fail to earn common dividends at the then prevailing prices, he said they were now not even earning dividends on their preferred stock.

"What we will eventually face, unless we receive better prices," he added significantly, "is something that I won't mention here. You know what it is. It cannot go on this way."

He denounced cuts in wage rates by some of the companies in the industry as a "pretty cheap sort of business." He condemned "learned economists and other people" who in seeking a remedy for depression "always get down to one thing, and that is to cut the 50c. an hour fellow."

We talk about the future. Strangely enough, it was only last night that I was reading the proceedings of our meeting in 1915. At that time I was on the Pacific Ocean coming around from San Francisco, one of the numerous occasions that I have been away from my job. And in reading this over I noticed Judge Gary's remarks. He said: "We are just emerging from a period of three years of crisis" —three years! "But," he said, "our prices have withheld, they have been pretty well held." Now what has happened in the last six months?

You know I said a year ago right in this very room that, if this thing kept on, I doubted if any steel manufacturer in the United States could earn a dividend on his common stock. I say now at present prices they are not earning dividends on preferred stock. We have got to set up a resistance against this constant pressure on the part of the buyers to ruin our business, and we have got to create a different sort of mentality in the minds of the heads of the selling companies. The time has gone by when you can put this all on the salesmen. It is the big chief here and there that does his work now. When you take $10 a ton off of pipe in one slice, it is not done by the salesman; when you cut something else $5 a ton and something else $7 a ton, it is not done by the salesman, it is done by the "comrade." (Laughter and applause.)

But seriously I do not see any hope of better prices in our business until the presidents of the companies are willing to stop this diabolical business—that is the word—the most diabolical situation that was ever perpetrated in the business, and it ought to be stopped. I am not seeking any alibi for myself except to say this, and I am going to say it here, that it has been the policy of the corporation that I am connected with for a long time to watch the barometer, I mean the price barometer.

We passed up that 2000 tons of wide strip, offered the other day, just passed it up. And this same thing happens all the time. Take the structural steel business: there are three or four interests in the structural business, but it is not an uncommon thing for prices to be $7 or $8 a ton apart. And every bridge engineer knows that the cost estimates on work of that character won't vary 50c. a ton between companies.

Now the whole question we are confronted with at the present time is that in some psychological way, some mystic way or some other way—mental way—we must get more money for our goods, or we won't be talking about a reduction of say 10 per cent on the wage earners. What we will eventually face unless we receive better prices is something that I won't mention here. You know what it is. It cannot go on this way. It is all well enough, you know, for some people just as soon as there is a little cloud in the sky to touch up the wages and knock something off the dividend and all that sort of business. But it is not honest for us to go on and sell our goods below the cost of production and deprive our stockholders and our workmen of what they are entitled to.

There is just one thing I want to refer to in corroboration of Mr. Schwab's statement, and that is this: taking into account our capacity, the country's capacity and the country's production, we ought to be thriving on a 50 per cent operation, we ought to be making a good profit. By what manner of means do people get it into their heads that if the production goes down they must sell cheap? We ought to get fair prices and we have got to make up our minds that the principal factor in the situation is resistance to unfair buyers' pressure. And that means, of course, passing business. I am not going to give the industry, Mr. Schwab, that sort of a benediction that you have given it and say now you are all fine men, and you are all doing good jobs. I say that we are not doing a good job and until we do a good job, we should not indulge in fulsome praise. (Prolonged applause.)

PRODUCTION MANAGEMENT

ONE session of the April meeting, in Cleveland, of the American Society of Mechanical Engineers was given over to a discussion of management as applied to the production of working drawings to be used as a basis for machinery manufacture. One paper, by Frank D. Newbury, general manager, machinery engineering, Westinghouse Electric & Mfg. Co., East Pittsburgh, dealt with methods which he has devised and put into operation at that plant. Another paper, by William J. Kunz, manager of drafting and engineering production, Combustion Engineering Corpn., New York, detailed the way in which that company handles similar problems.

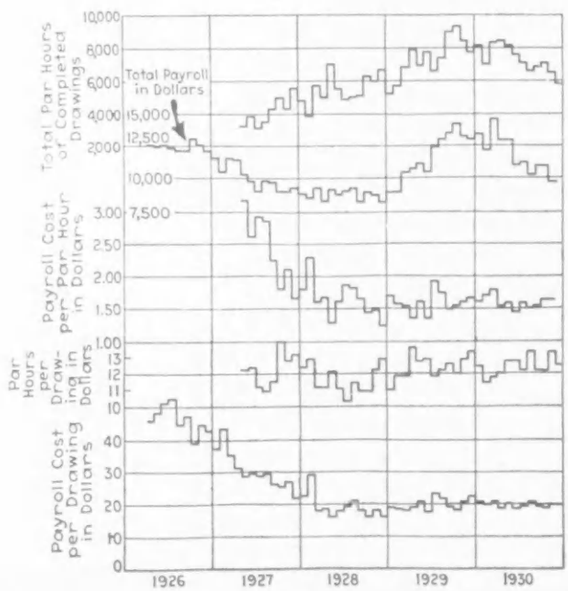
Abstracts of both papers follow:

Improving Drafting Management

By F. D. NEWBURY

DURING the past four years some new ideas have been applied to drafting management in several design departments of the Westinghouse company. The use of these methods has cut drafting costs in half, while average salary rates have been increased, design quality has been improved, and drafting accuracy has been maintained.

These results might not be significant if they had been obtained in only one instance. The same methods have been successively applied in three different departments aggregating about 570 people, mainly technically trained engineers and draftsmen, and have worked successfully in each. This new plan of operation was started early in 1927.



Costs of drafting show the improved practice as the years passed.

In the type of organization that has been developed, each department is divided into a suitable number of design units (called divisions), each complete with electrical or mechanical engineers (or both), design draftsmen and detail draftsmen, and in charge of one engineer-executive who directs and coordinates the work of both engineers and draftsmen. Everything possible is done to break down separation lines between engineers and draftsmen in the same division; these names carry no significance as to technical qualifications. Many of the engineers working with drafting equipment are better qualified as engineers by education and experience than many of the younger technical assistants who may be rated as engineers.

It is important that all engineers and draftsmen in a division report to one executive; hence the division cannot be too large (15 to 50 people constitute good limits); and there is no place for a chief draftsman, either in the department or in the division.

A second distinctive feature of this type of organization is the grouping of draftsmen of each division into relatively small squads, containing one to five men. Each squad is in charge of a squad leader, who is a qualified designer. He makes the general layouts assigned to his squad, assigns the work to his assistants and supervises their work. The squad leader has a definite design and production responsibility for the work assigned to his squad.

Drawings Not Checked by Separate Man

Practically all checking of drawings by separate checkers has been eliminated, by training detail

APPLIED IN THE DRAFTING DEPARTMENT

PERMITTING draftsmen to check their own drawings is a radical departure from established practice which has worked well in one plant. Two greatly differing methods of drafting room control are here described. And both are said to have given satisfactory results as to costs, as to volume of outturn, and as to coordination between squads engaged on various parts of the same problem.

draftsmen to check their own work. Careful records of drawing changes are maintained to show the class of change and the responsible individual. This practice of draftsmen checking their own work may be questioned by those who believe all drawings should be checked by an independent checker. Carefully maintained records have shown no increase in errors per drawing due to this system.

Records have shown a very considerable difference in accuracy among men; some men are inherently accurate and others are not. This difference in men is much greater than any difference in results due to checking methods, and indicates that good results can be attained most certainly by keeping individual accuracy records, and by releasing or transferring men who are not sufficiently accurate to do satisfactory drafting work.

Experience has shown the weakness inherent in the divided responsibility for accuracy that exists when separate checkers are used. When separate checking is a part of the established routine, the detail draftsman leans more and more on the checker, with an increasing deterioration in his own thoroughness and accuracy.

Par-Time Plan

IN measuring the useful output of a drafting organization, the single drawing—large or small, simple or complex—is most frequently taken as the unit of measurement. Sometimes the total square feet of drawings produced is used, but this measure also has obvious shortcomings. In the plan developed in the first design organization under discussion, the range of working drawings produced is divided into nine classes, depending upon the amount of work involved in making the working drawings, and ranging in time from 2 hours to 40 hours.

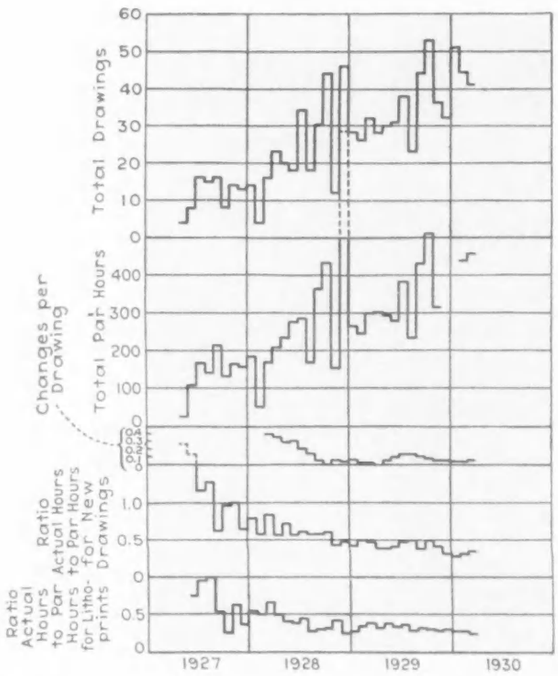
This time allowance, covering making and separately checking the pencil drawing, is intended to represent the time the drawing should require under ideal conditions. This means that the detail draftsman should be an experienced draftsman and a specialist on that particular kind of drawing. He should have, at his elbow, all necessary design information, and should not be compelled to repeat work because of changed information. In short, he should be able to work continuously at his drafting table. Each drawing, after it is completed, is given a "par-hour" rating by the production supervisor. This figure is analogous to the "allowed hours" for factory jobs.

In the beginning an attempt was made to give an accurate estimate of par hours to each new drawing when it was completed. It was found that a limited number of "classes" and corresponding par-hour values served the purpose with sufficient accuracy and were more satisfactory in use.

Results Show a Lowering of Costs

One illustration gives results in terms of costs of drafting. The total useful output is shown in the curve of total par hours of completed drawings; the total payroll cost is shown, and the other curves are derived from these.

The curve of average par hours per drawing is interesting in showing how the "work content" of drawings may vary from month to month, even in the same department. When these same data are taken from different departments handling different types



Production ratios and the errors of an individual draftsman, over a period of years, indicating progressive improvement.

of apparatus, the differences are much greater, as shown by the following examples taken from divisions of three different departments (the figures are averages of several months):

	Par Hours Per Drawing
Instrument transformers	4.0
Small distribution transformers	5.5
Large power transformers	8.1
Steam condensers	8.8
Alternating-current rotating machines	10.5
Direct-current rotating machines	15.5
Large steam turbines	17.7

The curves illustrate four distinct periods or phases occurring in successive years. During 1927 there was a slightly increasing drafting load and a substantially decreasing payroll. During this period operating ratios were improving, and the payroll costs per par hour and per drawing were considerably reduced. This was a period of rising standards, due to improvement in individuals and to the elimination of men who were not able to meet the new standards of performance.

During 1928 there was a considerable increase in drafting output, due largely to increased production of standard-part drawings as a part of a standardizing development program. The payroll and force did not change materially. There was continued improvement in performance, but at a decreased rate.

New Employees Work in Well

During 1929 there was a further considerable increase in drafting load (mainly caused by increased customers' orders) and a corresponding increase in payroll and personnel. The notable fact is that, in spite of this large influx of new draftsmen, the performance ratios indicated only a slight loss in efficiency. The effective assimilation of new employees is to be attributed to the small-squad type of organization. Ten new men distributed among ten squads, having ten good leaders, can be assimilated without loss of efficiency where the same ten new men added at one time to a single large drafting section, and attempting to work independently, might do more harm than good.

This experience during 1929 brought out an interesting fact that has been illustrated many times in similar factory situations: New men brought into the group met the existing average pace of the group in a much shorter time than was required for the original group to achieve the faster pace.

During 1930 there was a decreasing load, a decreasing force, and an improved efficiency. This illustrates the most difficult administrative problem: to maintain individual output and efficiency with a seriously falling load.

Keeping Tabs on Each Man

Probably the most important factor in administering this plan has been the individual basis of all records. Each draftsman producing detail drawings has been informed each month of his production ratios and the errors affecting his drawings. He has been given his own standing and the maximum, minimum and average figures of his division. A sample individual record is shown. This record is one of the best, but is typical as to improvement during the first 18 months of the period this par-time plan has been in operation.

The results have been used, even more effectively, to improve methods and working conditions. Probably a greater share of the improved performance has been possible because of improvements in the sphere of management than in those things for which the individual draftsman could be held responsible.

Incentives and the Human Element

PERFORMANCE ratios obtained by the par-time plan have not been used directly to determine salary payments. However, there has been an indirect relation that has been effective. Salary rates of individuals have been increased with due regard to production and error records. Individuals falling consid-

erably below average performance have been released or transferred to other work.

It may be possible to base salary payments directly on these performance ratios, but up to the present the dangers inherent in such an inflexible, mathematical application of the ratios have been considered too great to risk. When a plan of measurement directly affects the pay envelope, every figure used in the formula will be questioned.

This par-time plan has been effective partly because it has been used with good judgment. Draftsmen have accepted occasional "bad breaks" because they have known that they would be judged only on the basis of long-term averages and with a complete understanding of circumstances and conditions. The plan has been looked upon as a valuable guide to judgment and not as an inflexible measure that could be applied with a slide-rule.

Production Management in Drafting

By WILLIAM J. KUNZ

IN the design and fabrication of its equipment the Combustion Engineering Corpn. employs in its drafting department as many as 280 men, the number depending on the amount of work on hand. The combined effort of the department resulted in a production in excess of 10,000 drawings in 1928 and 12,000 drawings in 1929, varying in size from 1 sq. ft. to 10 sq. ft.

The drafting department is divided into three separate divisions—boilers, stoker and pulverized fuel. Each division is again divided into squads in accordance with the specific type of equipment for which, as to design and drawings, it is responsible.

There are two classes of design established in each division. First is the individual or specific equipment class, comprising a boiler or stoker or any other single product manufactured by this company. The second class of equipment is composed of a combination of any or all of these products, as the contract requirements may demand.

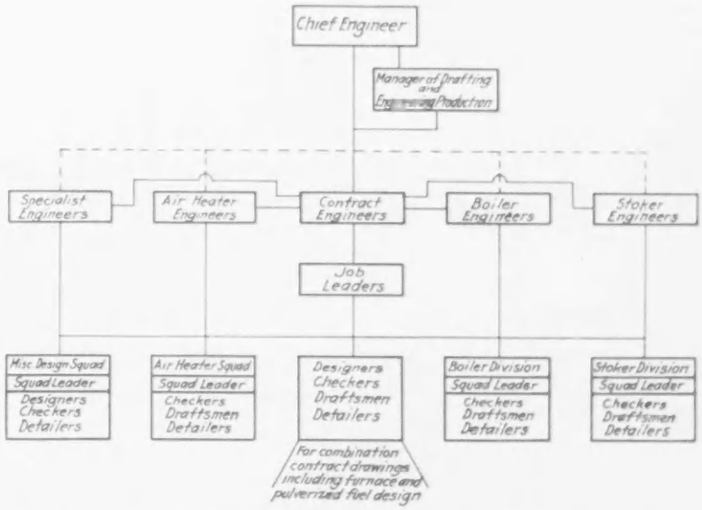
In the former class the design and drawing work will permit to some extent the use of so-called "standard drawings" which illustrate typical standard products. Drawings which are reproductions, the original of which was established and used on previous contracts, are also used whereever possible in the fulfillment of drawing requirements in this design class. In the latter class the possibility of using standard drawings is remote, as in almost every instance the contract involves equipment of combinations and sizes that are rarely the same, with such exceptions as true duplications of previous contracts.

With the physical limitation of building inclosures and the ever-increasing demand of greater steam output per cubic foot of building space, it is obvious that design work in this latter class is of a more or less special nature, and, while a definite principle of design may be followed on more than one contract, the possibility of using standard drawings is remote.

Control of Production

IN a drafting department such as this, the control of production does not involve alone the knowledge of what is being done by groups of individuals or squads. Also is it essential that the capabilities of, as well as the work on hand for, each individual in such groups or in the department as a whole must be known. To be fully informed as to the amount of work on hand for each man in the department, we have for ready reference a drafting department log sheet, which is brought up to date as frequently as is deemed necessary. This log sheet contains the name of every draftsman, checker, job leader and squad leader, and they are shown under the heading of their respective squads.

Periodically a survey is made of the work on hand, and against each individual is allotted an estimated time deemed necessary to bring to completion such



When contracts cover combinations of equipment, there must be a coordination among the departments, as indicated by the solid lines. The dotted lines show the flow on specific equipment orders.

drawings as are assigned to each man. This time, which is plotted in days, is then incorporated on the log sheet and forms a rather accurate estimate of the amount of work on hand for the individual or the particular group to which each individual is assigned and for the department as a whole.

The amount of work on hand for each squad can become very much unbalanced when considered in terms of man-day work for each squad, unless there are ways for correcting this condition.

Avoiding Too Much Disparity Between Squads

There are two ways in which this unbalanced condition can be overcome: (1) by assisting such new work as may come in to squads not fully occupied, or by transferring a part of the work from one squad to another; or (2) by changing individuals from a squad not fully occupied to one that is overloaded. In both of these methods there are apparent handicaps, and it is only after diligent study as to the capabilities of an individual as well as to the nature of the work that either method can be followed.

To permit transferring an individual from one squad to another, it is not sufficient that he have a good background of experience, but also that he have a fundamental understanding of his employers' products or equipment. A comprehensive knowledge of numerous products made by one company is seldom acquired except over a considerable period of time. There are, however, certain features of the equipment that are similar in nature of material or fabrication, such as structural steel, casings, brickwork, etc. In such instances the interchanging of individuals from one squad to another can be done without reflecting increased drawing costs or decreased production.

Over a period of time we have been able to determine which of our men are most versatile and flexible. These men can be interchanged between squads as conditions demand.

Responsibility Centralized

In the foregoing there has been one point definitely established—that in an industry such as this, with the magnitude of the work and the diversification thereof, it is of paramount importance that the engineering talent, as well as the drafting talent, be located in one central place and be responsible to one management.

If it were only a question of designing the specific products without relation to any of the other products, it would be practical to maintain at each shop an engineering department.

But with boiler shops located at St. Louis and at Chattanooga, Tenn., plate and structural shop at Phoenixville, Pa., machine shop at Chicago, and a combined machine shop and foundry at Monongahela, Pa., it would be a difficult matter to design combination contracts in shop offices without jeopardizing drawing costs or production, and would result in lack of united responsibility in establishing overall designs.

The essence of production is the speedy accomplishment of work on the lowest cost basis, and the unification of all interests concerned in any specific feature of design or the design as a whole.

Establishing Control of Drawing Costs

CONTROL of drawing costs in a drafting department of this size, with the variety of products that we are called on to design and the diversification in the combining of these products, is no small problem in the management of the department. To have an accurate cost record of all individual drawings, as well as the total drawings required for a job, we have in use a time record system that gives us, not alone cost data, but also an accurate story of what takes place on the job throughout its life in the drafting department.

An estimate is made each week on each job of the percentage of drafting work completed, based on the knowledge of drawing requirements for the entire job. With this information we are able to strike a balance weekly to determine whether the drawing costs are within the estimated allowance or whether this allowance is being exceeded.

Conclusion

As in other industries, the establishing of overall designs on some contracts requires the combining of our products with those of other manufacturers. In such cases the control of drafting production, as well as drawing costs, is influenced to a great extent by the cooperation received from the outside manufacturers, and in some instances by the purchasers.

On such jobs a certain amount of interchanging of designs and drawings between companies is necessary, so that the arranging of all of the component products of the overall design can be accomplished without infringing on each other, either by physical interferences or capacity characteristics. In all instances the purchaser of the combined unit must be consulted in the establishing of definite locations and clearances, within building inclosures, and with respect to auxiliary power-plant equipment being furnished under separate contracts.

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Distribution of Daylight in Buildings

ENGINEERING Research Bulletin No. 17 of the University of Michigan covers in 88 pages a study of a rapid method for predicting the distribution of daylight in buildings. It was prepared by Waclaw Turner-Szymanowski in connection with his work for the degree of doctor of science. It presents a detailed account of the protractor method based on the analytical formula of Higbie & Levin. This formula was evolved to determine the probable illumination from rectangular surface sources at any angle with the working plan.

A simpler mode of applying the formula is worked out in the present bulletin, which illustrates its application to each of eight different types of buildings. These examples of its use indicate that even the most complicated problems can be solved by the use of the charts developed by this method. The pamphlet is illustrated with about 70 line cuts and has a bibliography of previous work along this line.

FORESTS OF STEEL

LESS than one hundred years ago one would have seen here the upreaching arms of living trees. They have been metamorphosed into arms of steel through evolution and invention. From the original forest huge logs and timbers were laboriously transported by straining backs and knotted muscles. Today, electrical muscles and steel arms of the successors of the trees are lifters and carriers of the coal and ore used in the reproduction of their kind.

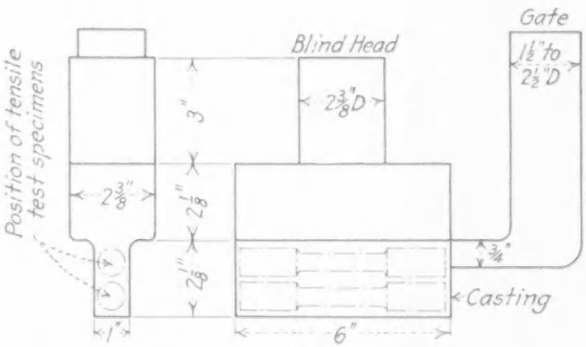
DEOXIDATION AND MOLD

By J. V. McCRAE and R. L. DOWDELL
United States Bureau of Standards

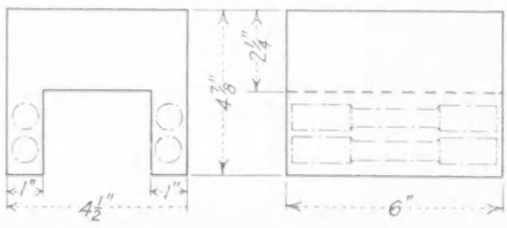
TENSILE properties frequently specified for acid electric steel castings, as minimum requirements, are an ultimate tensile strength of 60,000 lb. per sq. in., an elongation in a 2-in. gage length of 24 per cent, and 35 per cent reduction of area. When the test castings are made in dry sand molds no difficulty is encountered in meeting these requirements, but when green sand molds are used, the castings often lack soundness. This difficulty is usually overcome by the addition of a deoxidizer, usually aluminum, shortly before the metal is poured, but the test castings in this case not infrequently fail to meet the specification requirements with respect to ductility.

A study of this problem was undertaken by the bureau at the request of and with the cooperation of the Steel Castings Development Bureau, on the research association plan. The tensile properties and soundness of test castings of acid electric steel made in several steel foundries under a variety of conditions were investigated.

A rather detailed preliminary survey of the field was made by the study of 100 consecutive heats made under observed conditions in one foundry and 32 made in one other to illustrate the extent of the problem. The tendency toward low ductility is related to the carbon content of the steel.



FORM of test casting used by foundry "A," from which tensile bars were obtained as shown.



FORM of test casting used by foundry "B," from which tensile bars were obtained.

This preliminary survey indicated, in general, that, if the carbon content is maintained between 0.10 and 0.17 per cent, the manganese between 0.60 and 0.70 per cent and the silicon content between 0.30 and 0.40 per cent, the addition of about 1 lb. of aluminum per ton of steel to the working ladle shortly before pouring will not lower the ductility of the normalized castings below the usual specified limits.

Study of the different variables in ordinary acid electric steel foundry practice indicated that moderate changes in these variables have very little effect with respect to the matter of low ductility of the steel. Variations in the size and character of the scrap used in the charge have no appreciable effect. Alloying additions of nickel and of vanadium in moderate amounts do not appear to improve the ductility. Changes in heat treatment, aside from rather pronounced changes involving quenching and tempering which are not practicable in ordinary foundry practice, appeared to have no appreciable effect upon the low ductility of castings. There was some indication, however, that the use of a higher normalizing temperature, for example, 2000 deg. F. (1100 deg. C.) instead of 1650 deg. F. (900 deg. C.) is beneficial. The use of a rather high casting temperature appears to be associated with higher ductility.

Of a rather large number of additions used as possible deoxidizers, none were found superior to aluminum in producing soundness. Alloy deoxidizers containing aluminum produce essentially the same effect as the equivalent amount of aluminum. Aluminum and aluminum alloys do not reduce the ductility any more than the other types of effective deoxidizers used, such as ferroboron, silicon, zirconium and ferrotitanium. A considerable number of the additions used as possible deoxidizers were found to have a marked effect in reducing the ductility of the steel.

The relation between the amount of aluminum added to the steel and the resulting effect upon the ductility is not linear. The amount of aluminum necessary to insure soundness in green sand molds without seriously impairing the ductility may vary for different steel according to the melting practice, the mold condition and the state of oxidation of the steel when tapped. It is believed, however, that a sufficient amount of "deoxidizer" should be in the steel at the time of pouring to deoxidize the steel from the gases evolved by the green sand.

With normal practice the equivalent of about ½ lb. of aluminum per ton of steel, added in the form of metallic aluminum or as an alloy of aluminum,[1] will

[1] This is a brief abstract of a paper read at the Chicago meeting of the American Society for Steel Treating.

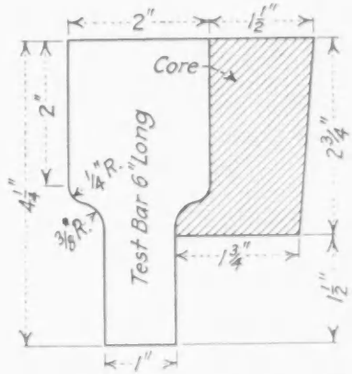
CONDITIONS IN MAKING CARBON STEEL CASTINGS

IMPROVING the quality of steel castings involves many things. The study to that end goes into such minutiae as the proper location in test ingots from which to take test pieces, what the shape of the test ingot shall be and whether a core should be used. Discussion here is centered largely around the steel making practice.

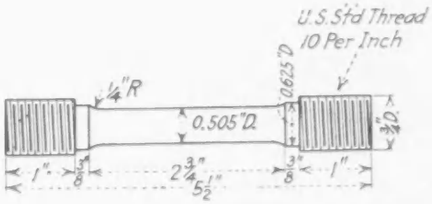
usually give sound castings which after normalizing will show ductility somewhat better than the specified minimum. If the aluminum is added during the tapping, the resulting castings may be somewhat porous. The addition of at least part of the aluminum immediately before pouring is recommended. Although there is no definite proof, the inference from this work that inclusions of Al_2O_3 are largely responsible for the low ductility resulting when aluminum is added to the steel shortly before casting would seem to be justified.

Results of a few experiments with mold preparations in the form of surface treatments for counteracting the influence of the moisture in green sand molds indicated that this method has merit, but the results were not especially promising.

The situation as regards porosity can generally be improved and the difficulties often overcome by controlling the mold conditions as regards moisture and permeability. By this method the minimum of aluminum or other deoxidizers are required to compensate for the gases evolved by the mold. If the carbon content is about 0.20 per cent, it will then be easier to meet the ductility specifications.



EXPERIMENTAL form of test casting adopted by the Steel Castings Development Bureau for tensile bars, to show the effects of both core and green sand on the cast steel.



Standard tensile test bar.

Need Perfect Control in Electric Furnace

A representative of the American Steel Foundries, which makes a practice of producing open-hearth steel castings, reported having had none of the difficulties discussed in the paper until an attempt was made to turn out acid steel electric castings. It was then found necessary to maintain a reducing atmosphere in the electric furnace. Additions of iron ore were made, but no lime was used.

This speaker expressed the conviction that we must have perfect control in the electric furnace if we are to get as good steel as can be obtained easily in the open-hearth furnace. The much shorter time element available in producing steel in the electric furnace was said to be the cause of this difference in requirements.

Whether or not to use aluminum in making steel for castings was discussed. One speaker reported getting reductions of area in test pieces varying from 31.5 to 63.1 per cent when no aluminum was used, the average being 47.2 per cent. When aluminum was used to kill the steel the reduction of area was much lower, ranging from 19.5 to 46.3 per cent, and averaging about 31.3 per cent. At the same time the elongation was found better when no aluminum was used, having been about 27.5 per cent against 22.2 per cent with aluminum.

GAS TRUCKS AND TRACTORS IN MATERIALS HANDLING

By GEORGE E. HAGEMANN
Associate Editor, Alexander Hamilton Institute, New York.

PRESENTED at the national materials-handling meeting of the American Society of Mechanical Engineers at Cleveland, April 15, this paper outlines many of the qualities and qualifications of one form of power unit. The intention was to show how such units will fit into a complete scheme of materials handling and it was emphasized that most industries require a variety of devices, rather than any one type.

INDUSTRIAL trucks and tractors are for more than mere carrying or pulling. Because of their independent operation and their possession of power units and of many kinds of auxiliary apparatus, they constitute completely self-contained, self-serving and thoroughly flexible handling devices. There are almost endless kinds of auxiliary apparatus now available on industrial trucks and types of service for which such equipment is suitable.

There are three types of industrial trucks and two types of tractors. Trucks are electric, gasoline or hand-operated; tractors are electric or gasoline propelled. All kinds are serviceable in the industrial concern, each in fields of work for which it is generally most suited. Local conditions have a deciding influence on the selection.

Many plants utilizing trucks can employ all thee types profitably, somewhat along the lines of the classification, and may employ tractors and trailers of one or both types, as well. Plants committed to tractor operation may use both types of tractors and probably will employ industrial trucks also, perhaps of all three types.

Each kind of equipment has advantages and disadvantages, inherent in its nature. They may militate against its use in certain fields where competing types alone may fit, or they may make it merely less serviceable or economical in those particular fields. In other cases the equipment in question may have its own exclusive fields of usefulness, and in other fields may offer greater service or lower operating costs than competing kinds of equipment.

TABLE I

Advantages and Disadvantages of Gasoline-driven Equipment

Advantages

1. Rugged construction.
2. Great mobility.
3. Flexible operation.
4. Wide spread of uses (lifting, carrying, pushing, pulling, etc.).
5. Independence of a parent source of power.
6. Service for 24 hr. a day.
7. Convenience of maintenance.
8. Low costs for repairs.
9. Absence of time out for charging batteries.
10. Elimination of charging station cost.
11. High power, high pulling capacity.
12. High speed of operation.
13. Ability to traverse streets and highways.
14. Does not require paved roadways or smooth floors
15. Will ride over obstacles with ease.
16. Simple to operate.
17. Easy to train drivers.
18. Undiminished power at end of day.
19. Will run on grades 7 to 10 per cent or more.

Disadvantages

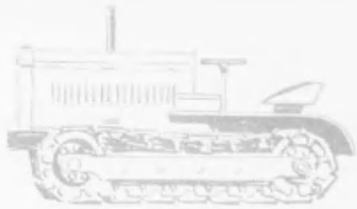
1. Fire hazard (greatly minimized by normal care, and in one case, at least, by special muffler).
2. Exhaust gases (causing objectionable odors and air pollution in certain plants).
3. Occasional difficulty of locating trouble in equipment.
4. Use on rough roadways is hard on tires.
5. Severe duty may keep equipment under repair quite frequently.
6. Noise of operation may be objectionable.
7. High speed may bring about an extra accident hazard.
8. Gasoline storage is required. (Most plants need this for motor trucks anyway).

TABLE II

Operating Cost Analysis of a Gasoline-driven Truck or Tractor Unit

Item	Per Cent, Based on Investment as 100 Per Cent (100)	Annual Amount ($2,500)
Investment		
1. Interest	6	150
2. Taxes, insurance	4	100
3. Maintenance (including batteries, tires or treads and all repair parts)	5	125
4. Depreciation	20	500
5. Cost of power and operating supplies (6 gal. gasoline, 1 qt. oil, in 8-hr. day, for 280 days.)	14	350
6. Operator (70c. an hour, 8-hr. day, for 280 days)	62-1/3	1,568
7. Supervision	4	100
8. General overhead (garage space, etc.)	2	50
	117-1/3	$2,943

Table I lists the main relative advantages and disadvantages of gasoline-driven industrial trucks and tractors.



These factors will not hold for each individual case, but they are considered sufficiently definite to represent a fair general statement. If a concern operates a fleet of trucks or tractors and finds that it can make the best use, in all but one or two cases, of either electric or gasoline-driven equipment, the company may standardize on that exclusively, for maintenance, repair and operating reasons, even though in a couple of departments the other kind of equipment might be somewhat more economical.

Reduction in cost of internal transportation brings up the important factor of operating expenses of gasoline-driven industrial trucks and tractors. Data are woefully lacking in this and other fields of mechanical handling. Cost accounting methods generally have not provided for the segregation of handling costs.

Expense factors vary so much with the number of units of equipment, the extent and nature of their use, grade of maintenance, degree of supervision, apportionment of general overhead and rate of truckers' wages that a fairly representative cost summary is difficult to construct. Progress in development, use and economical operation of equipment is hampered by the lack of reliable data. The values in Table II, although probably susceptible to attack from the standpoint of any one installation, serve to give some idea of approximate operating costs.

Actual economies obtained from the use of gasoline-operated industrial trucks and tractors are even more difficult to calculate than are operating costs of such equipment. Figures on the methods and devices supplanted by the truck or tractor system usually are unobtainable except by estimate. In most cases cost factors are forgotten or too roughly approximated, impairing the value of the results. Table III lists a few of the cases on which data have been collected as reliable as could be secured regarding cost savings.

A survey made by one truck maker, covering 443 customers, each using three or more gasoline-driven units, and some companies more than 60, disclosed a total of 2571 machines at work. They were distributed as follows:

Industry	Concerns	Machines	Averages (about)
Metal-working	169	1,309	8
Railroad and steamship lines	153	540	4
Clay products	27	193	7
Chemical	12	65	5
General	82	464	6
Total	443	2,571	6

It was estimated that 80 per cent of the installations replaced manual labor methods, and 20 per cent some other form of handling equipment.

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TABLE III

REPRESENTATIVE SAVINGS OR ECONOMIES THROUGH USE OF GASOLINE-DRIVEN EQUIPMENT

Equipment	User	Service	Performance or Economies
Williamette-Ersted "Hyster" double-drum hoist and ½ cu. yd. dragline bucket, operated by Caterpillar No. 15 tractor	Peoria & Pekin Union Railway Co., Peoria, Ill.	Cleaning out Culvert, 5 ft. 10 in. x 5 ft. 6 in. by 595 ft. long	Reduced cost from $1,178, by hand labor to $210.55 by equipment
Trackson Co. wheel tractor with shovel unit	Niles glass division of Mazda Lamp Works, Niles, Ohio	Handling coal	Each unit of fleet makes 200 trips of 150 ft. in an 8-hr. day and delivers over 88 cu. yd. of clay a day
Towmotor tractors	Studebaker Corpn.	Handling castings and dies	Make eight trips of two miles each, daily, hauling eight tons a trip over rough brick pavement
Towmotor tractor	Fisher Body Corpn.	Hauling trailers	Handles 6-ton loads up 12½ per cent grade 150 ft. long, and had no repair costs over a period of a year
Caterpillar tractor	Bancroft & Martin Rolling Mill Co., Portland, Me.	Haulage	Increased storage capacity 50 per cent
Caterpillar tractor	Minnesota By-Products Coke Co., St. Paul, Minn.	Snow removal	Saved $5,000 loss daily by snow removal during blizzard
Caterpillar tractors	New South Wales Government Railway	Hauling coal	Each tractor hauls five loaded cars (109 tons) 500 ft. to shipside, and the 24 tractors save $50,000 annually
Caterpillar tractor	Baltimore & Ohio Railroad, Washington, Ind.	Hauling work in repair shop	Saves two men and a locomotive, or $45 daily
Caterpillar tractor	Pennsylvania Railroad	Constructing drainage ditches	Pushed earth 350 ft., moving 750 cu. yd. Cost was 35c. to 40c. per cu. yd. Saving $680 to $720
Caterpillar tractor		Ditching along railroad	Saved $4,300 along one stretch of track
Cleveland Tractor Co. tractor	Baltimore & Ohio Railroad, Lorain, Ohio	Unloading iron ore	Reduced unloading time of boat 30 per cent and does work of nine or ten men

THIS building has been headquarters of Armco research since 1911. In recent years research activities have far outgrown its bounds so that a considerable part of the Middletown Central works has been turned over to research.

RESEARCH IS A MAJOR FUNCTION AT ARMCO

By BURNHAM FINNEY
Detroit Editor, The Iron Age

PROF. ALBERT SAUVEUR, dean of the American Rolling Mill Co.'s consulting staff, has said, "The efforts to increase the efficiency of metals, to increase their reliability, to make them fulfill new needs, has gone on incessantly. And wonderful results have indeed been obtained—results which would have been considered impossible of realization by the last generation—so remarkable that to the uninitiated our methods must appear well-nigh perfect.

"And yet how far we still are from perfection, that unattainable goal of human ambition. How much is still imperfectly understood in the extraction of metals, and in their subsequent treatment. How many phenomena remain unexplained, how many failures which thorough investigation still leaves unaccounted for. The field of research, the room for improvement, is still wide, and indeed widens and opens up new possibilities as we proceed forward in our eagerness for more knowledge, for a better understanding of the intimate properties of metals."

Something of this humbleness of spirit, this eagerness to pioneer in new fields, this desire to unveil the miracles which can be performed with metal, has animated the American Rolling Mill Co. since its beginning. It was founded in 1900 with a 25-ton basic open-hearth furnace, a bar mill for rolling 8 x 10-in. ingots weighing about 700 lb., and four hot mills, for the purpose of manufacturing specialty sheets.

Conditions then existing made it desirable to produce a basic open-hearth steel sheet which could be zinc coated. To accomplish this aim was the first step in systematic research work which has continued uninterrupted through the years, broadening and becoming more essential as time elapsed.

The steel industry has often been accused of short-

sightedness because of its lack of appreciation of the value of conducting a comprehensive research program. Although this generalization may possess some merit, research is the foundation-stone on which Armco's rapid growth has been built. In the beginning the mill constituted a life-sized research laboratory in the rough. It has never ceased to be that.

From One Achievement to the Next

AFTER "ingot iron" was perfected, the next important problem was to produce a sheet having magnetic properties, for use in the construction of electrical machinery, such as motors, generators and transformers. Realizing the commercial possibilities of an improved alloy steel sheet which would meet these requirements, Armco set to work on the task. Few scientific measuring instruments were available; it was necessary in one case to make its own piece of equipment for studying the product. Users of this class of sheets assisted, for such cooperation is essential in experimental work.

Perhaps the supreme achievement of research at Armco is the development of the continuous method of rolling sheets. Initial investigations began in 1909. A study of the flow of metals under the rolls was necessary. It was essential that there be a slight convexity of the rolls, each active pass cutting down the convexity until the surfaces of the sheet are commercially parallel. Before this could be accomplished, the various factors of the active pass—contour, temperature, composition, springiness and spacing of rolls—had to be determined by the most painstaking research.

This recital forms the preface to a most unusual story of how research is so much part and parcel of Armco that the two are indistinguishable. Dr. Anson Hayes, director of the Armco research laboratories, says, "Our philosophy is that competition in improved products and processes for their manufacture can be met only by means of organized research. The time was when industries felt comparatively secure through trade secrets and the protection of them.

"Through the development of the physical sciences and their application to industry, 'hocus-pocus' is no longer possible. Somewhat more recently, industry was content to take the results of university research and use such portions as could readily be adapted to production. Later still, certain limited facilities were maintained by industry to do what might be called 'commercial research.'

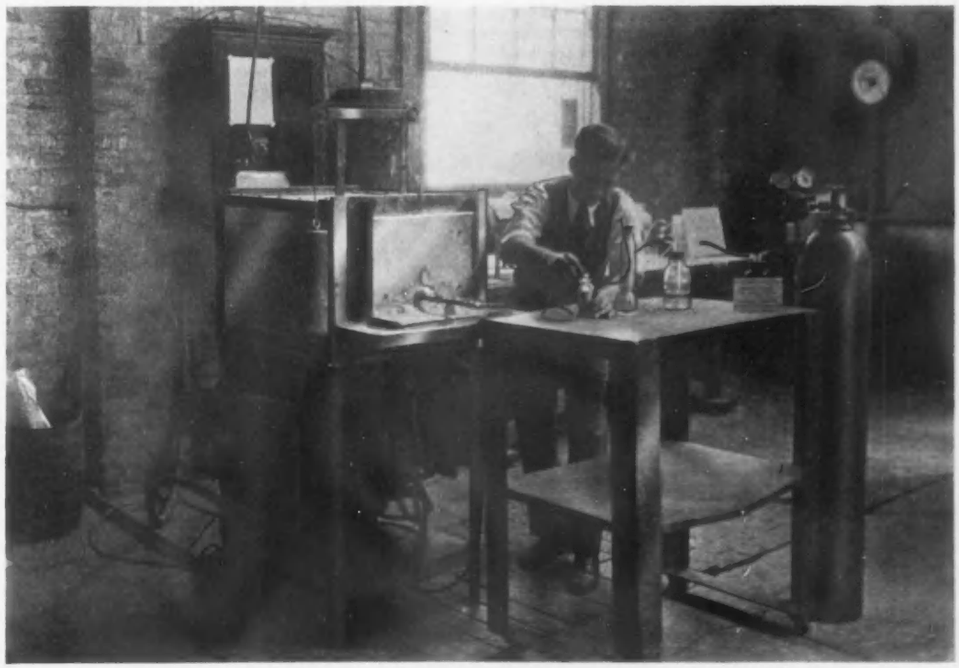
"These facilities have since been developed in centralized organizations the purpose of which is to use the advanced scientific material furnished through universities and thereby hasten the development of products and processes. At present industrial research is being organized for more than the so-called commercial research—that is, to apply modern science to the solution of its problems. Competition is forcing the maintenance of advanced groups to develop the fundamental physical sciences themselves."

Adapted to Study and Coordination

ARMCO'S laboratories are operated in such manner that their eyes and ears are open to the happenings throughout the organization and to the experiences of customers. They also must keep abreast of contemporary scientific developments. Therefore, they are set up to perform these functions: (a) engage in advanced scientific research, (b) supply information which will help improve present products and methods of manufacture, and (c) develop new methods of manufacture for old products and develop new products and proper methods for their manufacture.

In addition to these responsibilities, the labora-

SHEETS 12 x 30 in., in high 6 in. packs, are annealed in a Hoskins muffle-type furnace.



tories act as referee on all processes of control of products, both in chemical and physical tests. Moreover, intelligent use of scientific research information has become one of the most effective sales and publicity weapons. But the job of the laboratories does not end even here, for Armco does advanced research work in fields where its products are used by its customers.

The importance accorded research at Armco is indicated by the fact that it is one of four major groups reporting direct to the management. The others are finance and accounting, sales and publicity, and production.

Problems arise in a research organization exactly in the way that Topsy originated: that is, they just grow; and they multiply in such numbers that the director's chief worry is to select the more important for study and action. This matter has been worked out through an arrangement whereby the coordinated efforts of the laboratory, production personnel and a consulting staff are concentrated on every worthy project. The director also has the benefit of a staff of consultants comprised of outside authorities.

Whenever it becomes obvious that a certain project should be considered, an advisory group is appointed by the director to study it. This group consists of representatives from the sales department, publicity department, production department, research laboratory, and the consulting staff. The director is chairman of these advisory groups, which have as their purpose (a) bringing together of the best research talent throughout the organization on a particular subject, (b) better coordination between the works metallurgical departments and the research laboratories, (c) adaptation of the results of investigations to the needs of the sales, publicity, and operating departments.

Incidentally, nearly always there are certain phases of investigations which can best be carried out in production units, whereas other phases should be confined to the laboratory, where conditions can be carefully controlled.

With the help of the advisory group, the scope and plan of an investigation are determined. Members are kept informed of developments by means of progress reports sent out from the research laboratories. Meetings are held only at such times as important changes in plans or the formulation of new activities are thought necessary.

THE attitude of Armco's management on research is indicated by the following statement of George M. Verity, chairman of the board:

"Our business represents a somewhat exaggerated example of the need for research work, as in our case it represents the very foundation of our development. Thirty years ago our first small works made some 900 tons a month of the standard grades of sheet metal. Today our company has a production capacity of 100,000 tons a month of special-analysis, high-grade sheets of a kind neither known nor needed 25 years ago. This is a picture of our physical growth which has been made possible by patient and persistent research work.

"Today it is a part of our regular plan to study the requirements of manufacturers who demand a special sheet-metal product. Our research department tells us what grade of steel is required in the ingot; it also lays out the route for processing the sheets after they are rolled. It is then up to our various manufacturing departments to produce a sheet needed for a given purpose.

"It is interesting that, wherever a successful effort has been made to improve our methods of manufacture and reduce costs, in the end we have also secured a better quality of product. Quality is first influenced in the chemical composition and mechanical perfection of the ingot. Our new continuous rolling process for the reduction of a slab to a sheet has helped quality by giving a denser grain structure and a better surface. The last and most important contribution to quality comes in the long line of treatment or processing given the sheets after they are rolled.

"We spent 10 years in experiments covering all factors involved before we attempted to work out on paper a scheme for the continuous rolling of sheets.

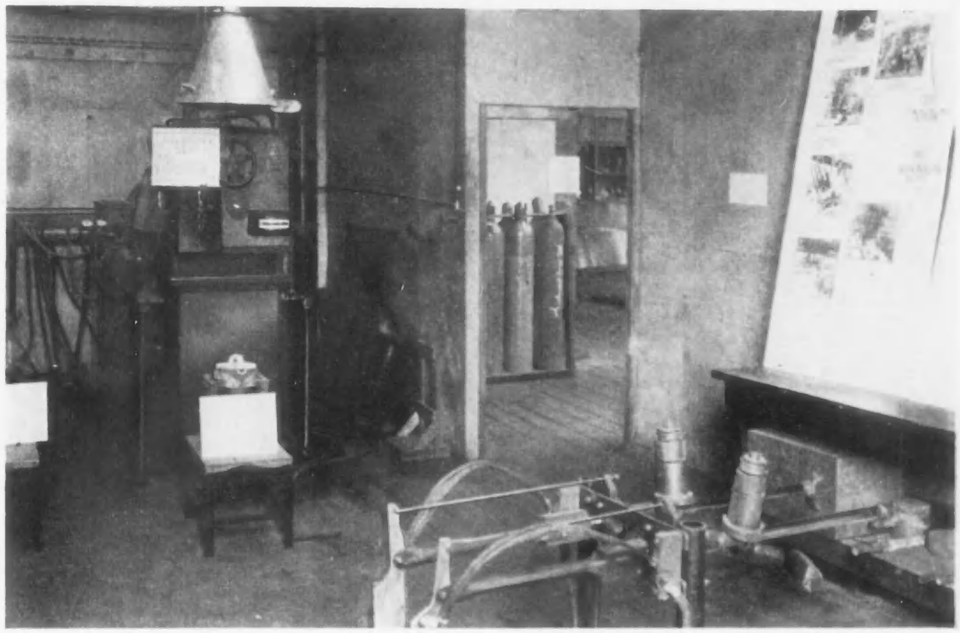
"Then we finally committed ourselves to the designing, building and operation of such a mill at Ashland, Ky.

"So in product development, in improved equipment and in processing, as well as in the final mechanization of our rolling processes, research has been the foundation of it all. Is it not true that all of the marvelous developments which make our present standards of living what they are have been founded on and are the direct result of patient, persistent and efficient research work? In every phase of human life research is changing civilization."

Electrical Sheet Steel

A FIELD in which an extensive research program has been carried on is electrical sheet steel. In this field Armco's research laboratories are constantly furnishing information on chemistry, metallurgy, rolling of the metal as against forging, and flow of the metal under various rolling conditions.

In the earlier designs of electric generators it was necessary to use large quantities of iron or steel in the magnetic circuit. Now that the magnetic characteristics of steel have improved 300 to 400 per cent, much more efficient motors, generators and transform-



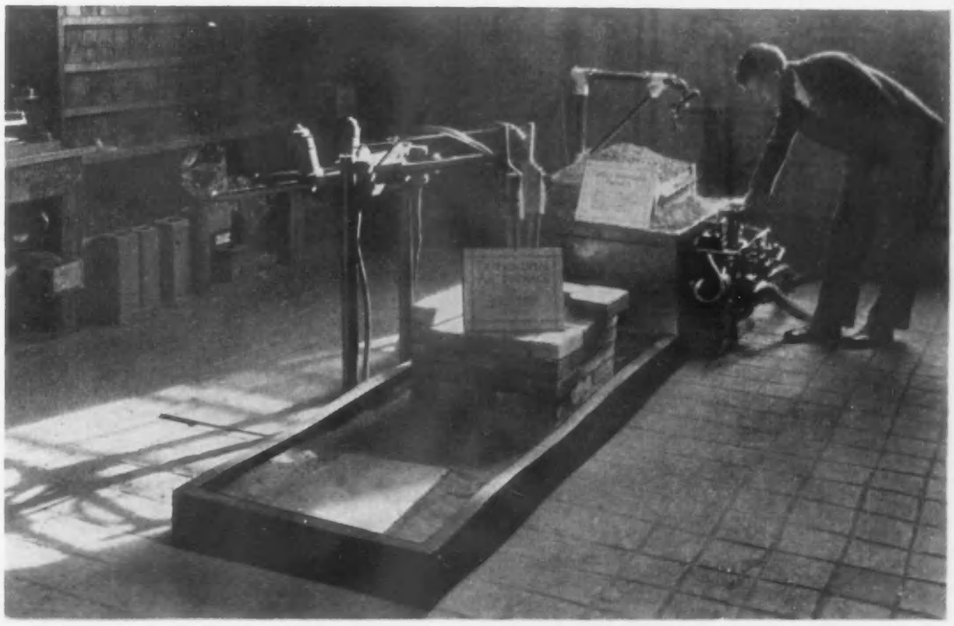
PRELIMINARY experimental heats are made in 30-lb. Ajax induction furnace. A hood is used to carry away fumes.

ers are constructed. Moreover, special alloy sheets have been developed having magnetic properties quite different from ordinary steels. The nature of their development and composition makes them much more expensive than other special-made sheets.

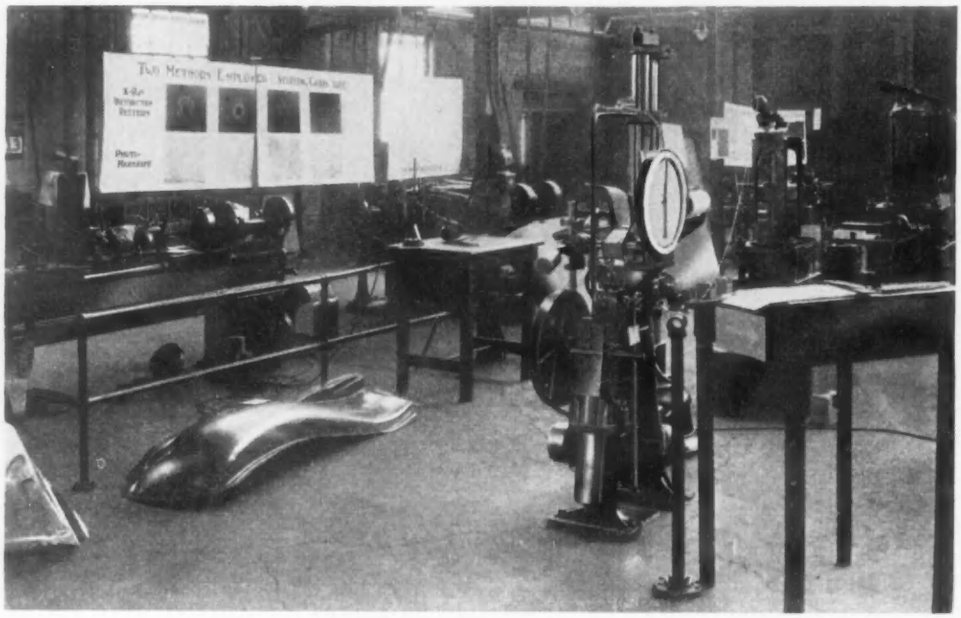
The work of the research laboratories resolves itself into four major interests: (a) development of corrosion-resistant materials, (b) development of better deep-drawing materials, (c) development of better magnetic sheet materials, and (d) development of new products for new uses. The tools for investigations in these fields range from those of physical science and mathematics, such as the application of physical optics, as seen in the high-powered microscope and interferometers, through high-vacuum equipment, to the less extensively used methods of modern statistics.

In 1911 Armco constructed a substantial building adjacent to its main office in Middletown, to house the research division. In the ensuing years, however, the far-flung research activities have far outgrown this once commodious home. Today a considerable part of the Middletown Central works, largely abandoned with the construction of a continuous sheet mill at the East works, has been turned over to research.

Various steps leading to the development of new sheet metals illustrate the thoroughness with which work is done. Preliminary experimental heats are made in an Ajax induction furnace, which melts 30



EXPERIMENTAL arc furnace, built by the laboratory, is used for special melting under controlled conditions. A Hoskins carbon - resistance furnace, in rear, which attains temperatures up to 3000 deg. F., is employed to melt metals, slags and packing refractories.



GENERAL view in laboratory where physical properties of sheet metals are studied. In the foreground is 20,000-lb. Amsler testing machine. In background at right are 30,000-lb. and 100,000-lb. Riehlé tensile testing machines.

lb. of ingot iron or alloys. This induction unit converts 60-cycle current into a frequency suitable for heating in such a small furnace, which can handle heats ranging from 30 lb. down to ½ lb. A hood is used to eliminate fumes.

Whenever results justify continuation of the experiments, the work is transferred to an electric furnace with a capacity of 500 lb., where heats are made. The next step is the use of a 6-ton electric furnace. If it is decided after this procedure to put a metal into production, several heats first are made in a 20-ton open-hearth furnace.

Special Equipment in Use

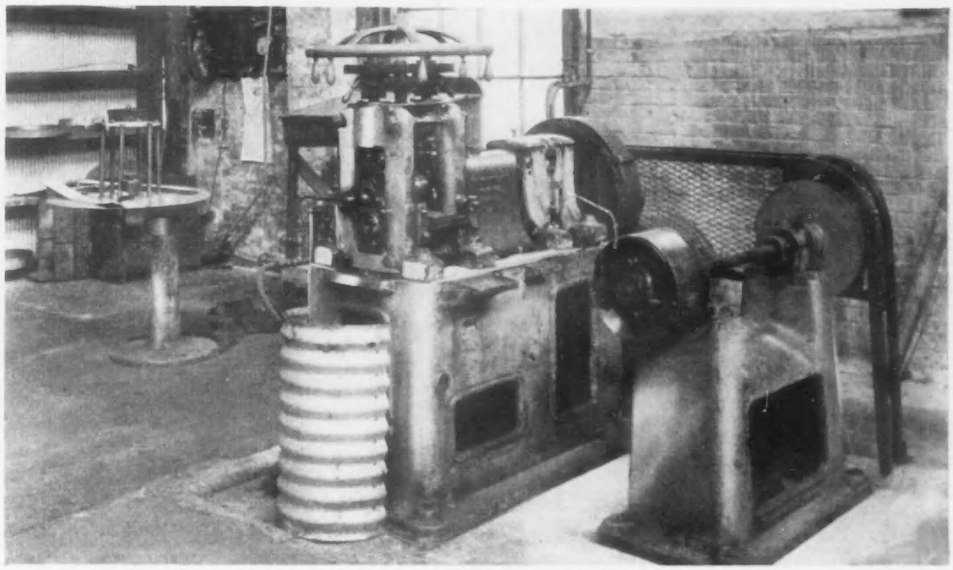
FOR special melting under controlled conditions the research division is equipped with an experimental arc furnace which was built in its own laboratories. The furnace operates on 30 volts and pulls 150 amp. at full load. A Hoskins carbon-resistance furnace has been installed to melt metals, slags and packing refractories. Running on 220 volts and pulling 220 amp., it attains temperatures up to 3000 deg. Fahr.

The division has designed and constructed an experimental cold-rolling mill for studying the effect of cold working on the physical properties and drawing qualities of strip and sheet steel. Annealing has been given close attention through the use of a Hoskins muffle-type furnace. Here sheets 12 x 30 in. in packs 6 in. high are annealed. The furnace operates on 220-volt current.

Various properties of sheet metals are tested by means of apparatus of standard makers, including a scleroscope hardness machine, Rockwell hardness tester, Erichsen ductility tester, 20,000-lb. Amsler testing machine, and 30,000-lb. Riehlé and 100,000-lb. Riehlé tensile testing machines.

In the fall of 1930 members of the National Re-

EQUIPMENT in physical laboratory includes scleroscope hardness tester, Rockwell hardness tester and Erichsen ductility tester.



RESEARCH division has designed and constructed an experimental cold-rolling mill for studying the effect of cold rolling on physical properties and drawing qualities of strip and sheet steel.

search Council visited several outstanding industrial plants in the United States, including the American Rolling Mill Co., to inspect their research facilities and to acquaint themselves with what industry is doing in investigational work to maintain its present position and to widen its vistas. On this occasion, Armco prepared for its visitors an exhibit visualizing its research accomplishments to date and demonstrating what part research has played in its growth. Because of the intense interest it aroused, this exhibit has been perpetuated as a feature to show to guests. The exhibit and the tools with which Armco researchers work, aside from those already mentioned, will be described in a succeeding issue.

Welding Will Not Replace Rivets in Building Construction

WELDING will not replace rivets in building construction, according to Lee H. Miller, Cleveland, chief engineer of the American Institute of Steel Construction, who addressed the Building Officials Conference of Toronto, Canada, April 23. Because it is newer, welding has been subjected to closer study, whereas rivets have been accepted without extensive research. This is the time, in the opinion of Mr. Miller, when the function and the performance of rivets under stress should be more intimately studied.

"Based upon my present experience and information," said Mr. Miller, "I consider it folly to claim we are now ready to abandon rivets, even though welds may be made to replace them, and it is as great a folly to wipe out welds from our industrial processes, because we lack the experience to inspect and analyze their properties.

"The exponent of welds obviously to me overstates his case in some of the claims that he makes. Such exaggerated statements impede the progress of the art, since they often close the mind of engineers, who recognize the exaggeration and as a result discard the whole subject until such time as it is presented without the virtues being entangled in chaff.

"Steel structures have failed under different conditions as to cause, but I have been unable to identify any structural failure resulting from rivets or where rivets have failed in service. Rivets have, however, failed in driving, either as a result of excessive heating for manufacturing the rivet, or for driving them. It is known that too high a temperature seriously injures the metallurgical structure of the steel and that once subjected to this high heat only by expensive treatment can the material be reconstructed.

"It has been stated that in the last five years there has been more research on welding and more data published on welding than there has been on rivets in the last fifty years or more.

"The routine of rivet inspection has a background of procedure that has met industrial and technical requirements over a long period of time and the non-destructive test or inspection of welds is relatively little understood. Until this talent is more widely distributed the conservative engineer adheres to rivets, but he can contribute to the distribution of knowledge on welds by employing them for secondary parts of the structure where the functions of the main frame are not involved."

STRENGTH AND DURABILITY OF SPUR GEAR TEETH

By EARLE BUCKINGHAM
Associate Professor, Massachusetts Institute of Technology, and Chairman, A. S. M. E. Special Research Committee on the Strength of Gears

IN designing gears, proper proportioning for the load is, of course, a first consideration. Increment loads due to shocks caused by inaccuracies of tooth form or spacing have been taken into account, but until recently these loads have been considered to be proportional to transmitted loads.

Professor Buckingham's work, however, has shown the case to be different: in metal gears the increment load is almost independent of the applied load. On the basis of this new principle, Professor Buckingham, in a paper at the fifteenth annual meeting of the American Gear Manufacturers' Association, offered new methods of calculating both the breaking and surface stresses. And these new methods will enable designers to select pitch and face proportions with greater certainty than heretofore.

THE nature and extent of the actual working or dynamic loads on gear teeth or on any other operating elements of a mechanism have long been open questions. In the absence of evidence to the contrary, these dynamic loads have generally been considered as being directly proportional to the applied loads.

Thus velocity factors have been established by running certain mechanical elements, such as ball-bearings or cast-iron gears, to destruction under varying speeds and loads. These applied loads, which cause failure, have then been divided by the static load which would cause a similar failure, and the quotients thus obtained have been used as velocity factors. For example, if a pair of cast-iron gears, running at a certain pitch line velocity, should fail under a transmitted load of 1000 lb., and if these same gears would fail under a static load of 3000 lb., the velocity factor for this speed would be taken as one-third. It is then assumed that, under these same velocity conditions, the dynamic load would be equal to three times the applied load, so with an applied load of 250 lb., the dynamic load would be equal to 750 lb.

In practice, this velocity factor has been used to reduce the safe working stress of the material by multiplying the safe static stress, which includes a liberal factor of safety, by the velocity factor. For the determination of this velocity factor, the Barth equation $\frac{600}{600 + V}$ or some modification of it, has been generally used.

Since 1923, a research committee, organized by the efforts of the late Wilfred Lewis, has been carrying on an investigation of this subject—an investigation made possible by the cooperation of the American Gear Manufacturers Association and the American Society of Mechanical Engineers. From time to time, progress reports have been issued, but it was not until the spring of 1930 that the results of these tests and their analysis justified the formulation of a simple method of obtaining a reasonably close approximation to the actual dynamic load conditions. A full report of the investigation of this committee to date is now in the hands of the printer and will be issued in the near future. The purpose of this paper is to give a brief report of the findings and to present a simple method of approximating the intensity of the dynamic loads on spur gear teeth.

The analysis of the dynamic loads, which is primarily the result of suggestions from Carl G. Barth, has been applied successfully to the results of three distinct and independent types of tests: first, the separation of the tooth surfaces as indicated by a break in the electric circuit between the teeth; second, surface fatigue tests where the failure of the tooth surface was taken as a measure of commensurate loads and loads which also set up compression stresses approximately equal to the ultimate compressive strength of the material; and third, actual breaking tests on cast-iron and semi-steel gears. The extent of the errors on the gears tested has ranged from 0.0005 to 0.0060 in., and, with the exception of the breaking tests, a wide va-

riety of materials has been tested. The computed results from this analysis, considering the nature and extent of the many uncertain factors such as the structure of the material and the many observational errors, have been remarkably consistent—generally within 25 per cent of each other. It would appear from this evidence that the proposed method of determining the dynamic loads on spur gear teeth can be safely employed and will give a far closer measure of the truth than any of the present methods.

Errors on gear tooth profiles, together with their deformation under load, cause the masses on the driving and driven shafts to change their velocities slightly. This change in momentum and velocity tends to cause the tooth surfaces to separate. This separation is resisted by the applied load and the surfaces of the teeth come together again with an impact. The additional or increment load set up by this impact depends primarily upon the amount of change of momentum in the revolving masses caused by the effective errors in the gear tooth profiles. On metal gears, where the effective error is primarily the initial error in the gear tooth profiles and the deformation under load is but a small part of the effective error, this increment load will not be directly proportional to the applied load but will be almost independent of it. On non-metallic gears, on the other hand, where the largest part of the effective error is the deformation under load, this increment load may be very nearly directly proportional to the applied load.

To sum up: The maximum dynamic loads on moving parts of a mechanism are impact loads, their intensity being the sum of the transmitted load and an increment load. This increment load is very nearly constant with metal parts for any given speed on any given mechanism. It is only when non-metallic parts with a very low modulus of elasticity are involved that the increment loads approach the condition where they are practically directly porportional to the applied loads. The stresses set up by these impacts must not exceed the compressive fatigue limits of the materials employed if excessive wear is to be avoided. For metal parts, where the increment load is practically independent of the intensity of the applied load, a margin of safety would appear to be a more logical value to use than a factor of safety. Dynamic loads on metal parts are not directly proportional to the applied loads, hence the use of velocity factors in such cases is not only incorrect but is also misleading.

The various equations required for a complete and detailed analysis of the dynamic load phenomena are complex and require the use of values for many factors. For general use, it is often desirable to have simple equations which will give a reasonably close approximation to the actual load conditions. It should be fully appreciated, however, that such formulas can cover only the normal or average conditions. As with all other engineering standards and approximate equations, exceptional conditions should receive special consideration. Thus for example, where gears are to be used for an airplane propellor drive and the weight of the gear blanks have been reduced to a minimum, the mass conditions will be much below the average and the use of these general equations may give increment load values somewhat larger than the actual ones. On the other hand, if the gear is very large and the gear blank is also to act as a flywheel, the mass conditions may be very much greater than the average and the use of these general equations may give increment load values somewhat smaller than the actual ones.

As noted before, the maximum dynamic load on gear teeth is the sum of the applied load and an additional or increment load resulting from the inertia of the masses and the variations in velocity set up by the action of the effective errors in the gear teeth. This maximum load is but momentary, yet the teeth must be strong enough to carry it.

The following equations apply to metal spur gears:

W = Total tooth load transmitted, lb.
T = Width of gear face, in.
f = Applied load in lb. per in. of face.
V = Pitch line velocity in ft. per min.
I = Increment load in lb. per in. of face.
f_z = Load in lb. per in. of face required to deform teeth the amount of the effective error.
C = Tabulated value representing load required to deform tooth of given material and form a given amount.
W_d = Total maximum dynamic tooth load, lb.

Then:

$$f_z = f + C \qquad (1)$$

$$f = \frac{W}{T} \qquad (2)$$

$$I = \frac{0.05\ V\ f_z}{0.05\ V + \sqrt{f_z}} \qquad (3)$$

$$W_d = T\ (f + I) \qquad (4)$$

The value of C will vary directly proportional to the extent of the error. As the modulus of elasticity of cast-iron and bronze are nearly alike, the values of C given in Table 1 for cast-iron can also be used for bronze.

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Table 1—Values of C

Materials	Tooth Form	Measured Error in Inches .0005	.001	.002	.003
Cast iron and cast iron	14½ deg. involute	400	800	1600	2400
Cast iron and cast iron	20 deg. full depth	415	830	1660	2490
Cast iron and cast iron	20 deg. stub	430	860	1720	2580
Cast iron and steel	14½ deg. involute	550	1100	2200	3300
Cast iron and steel	20 deg. full depth	570	1140	2280	3420
Cast iron and steel	20 deg. stub	590	1180	2360	3540
Steel and steel....	14½ deg. involute	800	1600	3200	4800
Steel and steel....	20 deg. full depth	830	1660	3320	4980
Steel and steel....	20 deg. stub	860	1720	3440	5160

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In order to simplify the use of this material still further, Table 2 has been prepared which gives the values of I, as calculated by Equation 3, for pitch line velocities up to 5000 ft. per min. corresponding to values of f_z up to 6000 lb. Thus for any given combination of materials with any known error, the value of f_z is determined by adding the corresponding value of C from Table 1 to the amount of the transmitted load per inch of face. Then the value of I for the specified pitch line velocity may be taken from

Table 2 from the column headed by the pedetermined value of f_v.

The above equations and the tables will give a close approximation to the intensity of the maximum instantaneous dynamic load. We must next have some measure of the beam strength of the gear teeth to insure that they will be strong enough to withstand this dynamic load without breaking. For this purpose we have the Lewis formula which is as follows:

When :

W_s = Limiting static tooth load for beam strength, lb.

S = Elastic limit of material, lb. per sq. in.

p = Circular pitch of teeth, in.

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Table 3—Values for Ws
for 14½ deg. tooth form, 1 DP, 1-in. face

Number of Teeth	Cast-Iron	Semi-Steel and Bronze	Cast-Steel	S.A.E. 1030 Steel	S.A.E. 1045 Steel	S.A.E. 3245 Steel
	Values of S					
	24,000	36,000	45,000	60,000	90,000	120,000
12	5,160	7,740	9,675	12,900	19,350	25,800
13	5,354	8,031	10,040	13,386	20,079	26,772
14	5,654	8,482	10,602	14,136	21,204	28,272
15	5,880	8,820	11,025	14,700	22,050	29,400
16	6,108	9,162	11,452	15,270	22,905	30,540
17	6,333	9,500	11,875	15,834	23,751	31,668
18	6,484	9,727	12,159	16,212	24,318	32,424
19	6,636	9,954	12,442	16,590	24,885	33,180
20	6,784	10,177	12,721	16,962	25,443	33,924
21	6,936	10,404	13,005	17,340	26,010	34,680
23	7,087	10,630	13,288	17,718	26,577	35,436
25	7,312	10,969	13,711	18,282	27,423	36,564
27	7,464	11,196	13,995	18,660	27,990	37,320
30	7,615	11,422	14,278	19,038	28,557	38,076
34	7,840	11,761	14,701	19,602	29,403	39,204
38	7,992	11,988	14,985	19,980	29,970	39,960
43	8,143	12,214	15,268	20,358	30,537	40,716
50	8,294	12,441	15,552	20,736	31,104	41,472
60	8,520	12,780	15,975	21,300	31,950	42,600
75	8,671	13,006	16,258	21,678	32,517	43,356
100	8,822	13,233	16,542	22,056	33,084	44,112
150	8,973	13,464	16,825	22,434	33,651	44,868
300	9,199	13,798	17,248	22,998	34,497	45,996
Rack	9,350	14,025	17,532	23,376	35,064	46,752

Table 4—Values of Ws
for 20-deg. full-depth tooth form, 1 DP, 1-in. face

Number of Teeth	Cast Iron	Semi-Steel and Bronze	Cast Steel	S.A.E. 1030 Steel	S.A.E. 1045 Steel	S.A.E. 3245 Steel
	Values of S					
	24,000	36,000	45,000	60,000	90,000	120,000
12	5,880	8,820	11,025	14,700	22,050	29,400
13	6,259	9,388	11,736	15,648	23,472	31,296
14	6,636	9,954	12,442	16,590	24,885	33,180
15	6,936	10,404	13,005	17,340	26,010	34,680
16	7,087	10,630	13,288	17,718	26,577	35,436
17	7,238	10,857	13,572	18,096	27,144	36,192
18	7,389	11,084	13,855	18,474	27,711	36,948
19	7,540	11,311	14,139	18,852	28,278	37,704
20	7,689	11,534	14,418	19,224	28,836	38,448
21	7,840	11,761	14,701	9,602	29,403	39,204
23	7,992	11,988	14,985	19,980	29,970	39,960
25	8,143	12,214	15,268	20,358	30,537	40,716
27	8,368	12,553	15,691	20,922	31,383	41,844
30	8,594	12,891	16,114	21,486	32,229	42,972
34	8,896	13,345	16,681	22,242	33,363	44,484
38	9,199	13,798	17,248	22,998	34,497	45,996
43	9,499	14,248	17,811	23,748	35,622	47,496
50	9,801	14,702	18,378	24,504	36,756	49,008
60	10,104	15,156	18,945	25,260	37,890	50,520
75	10,404	15,606	19,507	26,010	39,015	52,020
100	10,706	16,059	20,074	26,766	40,149	53,532
150	11,008	16,513	20,641	27,522	41,283	55,044
300	11,308	16,963	21,204	28,272	42,408	56,544
Rack	11,611	17,416	21,771	29,028	43,542	58,056

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Table 2—Values for I

For Value of f_v

V	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
100	91	137	172	201	227	251	273	293	312	330	347	364
200	155	240	308	365	417	463	506	546	584	619	653	686
300	201	322	419	502	577	645	708	767	822	875	925	973
400	236	387	511	618	714	802	884	961	1034	1102	1168	1231
500	264	442	588	717	833	940	1040	1133	1222	1306	1386	1464
600	286	487	655	803	938	1062	1178	1287	1391	1489	1584	1675
800	321	558	762	944	1111	1266	1412	1550	1669	1806	1927	2043
1000	346	613	845	1056	1250	1432	1603	1766	1922	2071	2215	2354
1200	364	655	912	1146	1364	1568	1765	1947	2125	2295	2460	2619
1400	379	689	966	1220	1458	1683	1897	2101	2298	2487	2671	2848
1600	391	717	1010	1283	1538	1781	2012	2234	2448	2654	2854	3048
2000	409	760	1081	1382	1667	1938	2199	2450	2759	2929	3158	3381
2500	424	798	1145	1473	1786	2086	2376	2656	2928	3193	3452	3704
3000	435	826	1192	1541	1875	2198	2510	2813	3109	3398	3680	3957
3500	443	847	1228	1593	1944	2285	2616	2938	3253	3561	3863	4159
4000	450	863	1257	1635	2000	2355	2701	3039	3370	3694	4012	4325
4500	455	877	1280	1668	2045	2413	2771	3122	3466	3804	4136	4463
5000	459	888	1299	1697	2083	2461	2830	3192	3548	3898	4242	4581

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T = Width of face of gear, in.

y = Tooth form factor.

Then:

$$W_s = SpTy \qquad (5)$$

To simplify the use of this material on static beam strength, Tables 3, 4, and 5 have been prepared which give the static beam strength of 1 DP gears of 1-in. face for the three most commonly used gear-tooth systems. The values in these tables should be divided by the diametral pitch which is to be used and multiplied by the width of face in inches of the gear blanks which are to be used.

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Table 5—Values of Ws
for 20 deg. stub tooth form, 1 DP, 1-in. face

Number of Teeth	Cast Iron	Semi-Steel and Bronze	Cast Steel	S.A.E. 1030 Steel	S.A.E. 1045 Steel	S.A.E. 3245 Steel
	Values of S					
	24,000	36,000	45,000	60,000	90,000	120,000
12	7,464	11,196	13,995	18,660	27,990	37,320
13	7,776	11,649	14,562	19,416	29,124	38,832
14	8,143	12,214	15,268	20,358	30,537	40,716
15	8,368	12,553	15,691	20,922	31,386	41,844
16	8,671	13,006	16,258	21,678	32,517	43,356
17	8,822	13,233	16,542	22,056	33,084	44,112
18	9,048	13,572	16,965	22,620	33,930	45,240
19	9,275	13,910	17,388	23,184	34,776	46,368
20	9,424	14,137	17,671	23,562	35,343	47,124
21	9,576	14,364	17,955	23,940	35,910	47,880
23	9,801	14,702	18,378	24,504	36,756	49,008
25	10,027	15,040	18,801	25,068	37,602	50,136
27	10,255	15,382	19,228	25,638	38,457	51,276
30	10,480	15,721	19,651	26,202	39,303	52,404
34	10,706	16,059	20,074	26,766	40,149	53,532
38	10,932	16,398	20,497	27,330	40,995	54,660
43	11,083	16,624	20,781	27,708	41,562	55,416
50	11,385	17,078	21,348	28,464	42,696	56,928
60	11,611	17,416	21,771	29,028	43,542	58,056
75	11,913	17,870	22,338	29,784	44,676	59,568
100	12,139	18,208	22,761	30,348	45,522	60,696
150	12,441	18,662	23,328	31,104	46,656	62,208
300	12,818	19,227	24,034	32,046	48,069	64,092
Rack	13,193	19,792	24,741	32,988	49,482	65,976

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We must also have some measure of the durability of the surfaces of the gear teeth so as to avoid excessive wear. For this purpose we can use the following equations and values:

When:

W_w = Limiting static tooth load for wear, lb.

D = Pitch diameter of pinion, in.

T = Width of face, in.

Q = Ratio factor.

K = Load-stress factor.

n = Number of teeth in pinion.

N = Number of teeth in gear.

E_1 and E_2 = Modulus of elasticity of material.

S_f = Compressive fatigue limit stress for material, lb. per sq. in.

A = Pressure angle of tooth form.

Then:

$$Q = \frac{2N}{n+N} \qquad (6)$$

$$K = \frac{S_f^2 \sin A}{1.400}\left(\frac{1}{E_1} + \frac{1}{E_2}\right) \qquad (7)$$

$$W_w = D\ T\ K\ Q \qquad (8)$$

To simplify the use of this material, Table 6 has been prepared which gives values for K corresponding to the probable fatigue limit stress for the materials. For the sake of simplicity, a pressure angle of $14\frac{1}{2}$ deg. has been employed in computing these tabulated values.

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Table 6—Values of K

Materials	Assumed Fatigue Limit in Compression, Lb. per Sq. In.	Maximum Specific Compressive Stress	K
Cast steel and cast steel	60,000 60,000	60,000	43
Forged steel and cast steel	80,000 60,000	65,000	50
Forged steel and forged steel	80,000 80,000	80,000	76
Hardened steel and cast steel	220,000 60,000	90,000	96
Forged steel and semi-steel	80,000 90,000	80,000	114
Hardened steel and phosphor bronze	220,000 70,000	85,000	135
Hardened steel and semi-steel	220,000 90,000	90,000	145
Heat-treated steel and heat-treated steel	120,000 120,000	120,000	171
Semi-steel and semi-steel	90,000 90,000	90,000	193
Hardened steel and heat-treated steel	220,000 120,000	136,000	201
Hardened steel and hardened steel	220,000 220,000	220,000	376

These figures represent the limiting load conditions and make allowance for the cold-working received in operation. The dynamic loads should be such that somewhat lower values are used, depending upon the margin of safety required for any specific application. These figures are also based upon smooth tooth surfaces.

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As an example of the use of this material we shall consider the following:

A pair of 8 DP gears, $14\frac{1}{2}$ deg. tooth form, of 33 and 59 teeth, 1.250 in. width of face were used in a machine, running at a pitch line velocity of about 300 ft. per min. and transmitting a tooth load of about 400 lb. Originally these gears were of semi-steel and had operated satisfactorily for several years. Recently they were replaced with machine-steel gears, the material being about the same as SAE 1045 steel, and in about eight weeks they were worn so badly as to be practically worthless.

The extent of the error to be expected on well-cut gears of this size is about 0.002 in. Using this value as a measure of their accuracy, we have the following for the original semi-steel gears:

$$f = \frac{400}{1.25} = 320 \qquad \text{(Equation 2)}$$

$V = 300$

$T = 1.25$

From Table 1 we obtain:

$C = 1600$

$f_2 = 320 + 1600 = 1920$ (Equation 1)

From Table 2 we obtain:

$I = 500$

$W_d = 1.25\ (320 + 500) = 1025$ lb. (Equation 4)

From Table 3 we have for the static beam strength of the 33 tooth, 8 DP semi-steel pinion, when S = 36,000:

$$W_s = \frac{11{,}700 \times 1.25}{8} = 1828 \text{ lb.}$$

Here we have a margin of safety of 800 lb., which is double the applied load. The factor of safety would be equal to 1.78, which seems low according to our usual ideas, yet it has proved to be ample in this case.

We will next examine the wear conditions on this drive. For the solution of Equations 6 and 8 we have the following:

$D = 4.125$

$T = 1.250$

$n = 33$

$N = 59$

$$Q = \frac{118}{92} = 1.282 \qquad \text{(Equation 6)}$$

From Table 6 we obtain:

$K = 193$

$W_w = 4.125 \times 1.25 \times 1.282 \times 193 = 1276$ (Equation 8)

This last value which represents the limiting load for wear is about 250 lb. greater than the dynamic load. In other words we have a margin of safety of 250 lb., which seems somewhat small, yet it has proved to be sufficient in service.

We will next compute in a similar manner the dynamic load conditions on the machine-steel gears. For these we have:

$f = 320$

$V = 300$

$T = 1.25$

From Table 1 we obtain:

$C = 3200$

Whence:

$f_2 = 320 + 3200 = 3520$ (Equation 1)

From Table 2 we obtain:

$I = 710$

$W_d = 1.25\ (320 + 710) = 1288$ lb. (Equation 4)

From Table 3 we have for the static beam strength of the 33 tooth, 8 DP pinion

$$W_s = \frac{29{,}100 \times 1.25}{8} = 4547 \text{ lb.}$$

Here we have, for beam strength, a margin of safety of about 3250 lb., and a factor of safety of 3.53. But the trouble here is excessive wear and not the breaking of the tooth.

For the wear load conditions we have:

$D = 4.125$

$T = 1.250$

$Q = 1.282$

And from Equation 7, using a value of S_f equal to 90,000 lb. per sq. in.:

$K = 96$

Whence from Equation 8:

$W_w = 635$ lb.

In this case, the dynamic load is more than double the limiting load for wear, hence the rapid wear which took place is something to be expected. This example serves to check the validity of the method.

STEEL WAGE RATES SHOULD

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SOME have said that the period to which we have been adjusting ourselves was a necessary economic reaction and others have said that it was due to fear. It is the job of industry to look into both of these causes, for they both exist, and to see what we have done and should do to put our house in order.

There are two clouds over our business horizon which account not only for the fear in Wall Street, but likewise for the hesitation on the part of business and the consumer. The first thought to which I refer is the fear on the part of millions of American families that there will be a cut in the wage rates, and a lower living standard. This fear has led the public to husband its savings, to wear old clothes, to postpone the buying of homes, to curtail purchases far below the level of normal needs.

Especially in the past few months we have heard a good deal of talk about the liquidation of wages as though this were to be accomplished only through the cutting of the wage rate and the reduction of the amount of money in the payroll.

Labor Costs Already Liquidated

I am fully mindful of the obligation of industry to the investing public. I am aware that the reduction of dividends properly raises the question as to whether there has been a reduction in labor costs, but I say that labor costs in the steel industry can be and have been liquidated without taking it out of the wage rate of the mill employee. Labor costs can be liquidated either by greater efficiency or by a slash in rates. To arbitrarily cut rates is much the easier method. It is a simple matter for management to take the payroll and say: "Cut it 10 per cent." But the former method is the one that has permanent value. In getting lower labor costs through increased efficiency, industry so improves its production facilities that the cost per ton is far less, and yet the buying power and the living standard of our people need not be threatened.

A simple example will illustrate my point. Let us say that in 1923 the labor of one mill employee working at $5 a day produced one unit of steel. It would be possible to cut that wage rate a dollar so that the same man would produce this unit of steel at a cost of only $4 a day. But in my judgment there is a more effective way. Improve the routing of your materials; add modern machinery, improve supervision and planning, and other efficiencies; and you have one man at $5 a day producing two units of steel. You have cut your labor cost to $2.50, liquidated it by 50 per cent, and at the same time protected the wage and living standards of your working force.

Twelve Years of Labor Peace

That, gentlemen, is what has taken place in the steel industry. I know of no period in the history of American industry when our business has been more entitled to take a just and humble pride in its accomplishments on behalf of our national well being. The steel industry has had a dozen years of peace in its labor relationships. Through established conference plans it has built up an honest, effective and mutually satisfactory form of organization which has formed a meeting ground for management and men so that all problems have been adjusted in friendliness and fairness.

The wages for steel workers are as high as any in the large manufacturing industries; and we have had a stabilized wage rate since 1923. In boom times our men have done the square thing by us. We have not had strikes or unreasonable demands to disturb us when markets were good, and in dull times we have not tried to take our loss of business out of the hide of the worker by reducing wage scales. This cooperation between management and workers has saved the

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LOSS of income through part-time employment and fear of further depletion of earnings as a result of wage rate reductions have been major contributing factors to the depression. Recent deflation of retail prices has tended to offset unavoidable curtailment of wage earnings. Wage rates, in the steel industry at any rate, should be maintained, Charles M. Schwab told the American Iron and Steel Institute in his presidential address at New York, May 22. Labor costs in the steel industry can be, and have been, liquidated without taking it out of the wage rate of the mill employee.

Liquidation of prices necessary to economic

BE MAINTAINED

By CHARLES M. SCHWAB

CHARLES M. SCHWAB

steel industry hundreds of millions of dollars. It is an outstanding example of the ability of business leadership to cope with the problems of this industrial age.

Preservation of Wage Rates a Primary Obligation

Preservation of this wage rate, the protection of the workers' payroll is a primary obligation of our business. All policies, of course, depend ultimately on the balance sheet. No man can guarantee the future of markets, wages, earnings or other factors affecting income. But I do say that we have every intention of maintaining this stable wage rate which has been so great an asset in our business.

I am not attempting to speak for other lines of business. There are businesses where wages are out of line, where wages have been pyramided during boom times until they are almost three times those in most manufacturing lines, and where there has been virtually no liquidation through greater productivity per man. Indeed there is even arbitrary limitation of production in some businesses. In such cases the labor cost per operation is far greater than it was two years ago or 10 years ago. There is where liquidation would help. These conditions do not exist in our industry. We have liquidated our labor costs through greater efficiency. We have stabilized our industrial relationships over a long period of years. Our men have stuck by us through thick and thin, and we are going to stick by them.

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readjustment has been severe, with a number of important basic commodities selling at distress levels. The price of any commodity should cover the cost of plant and materials, and a fair return to capital and labor. A great excess over that amount is destructive to trade and a decline from that amount is even more harmful, declared Mr. Schwab.

Wholesale prices, in fact, had been trending downward for 10 years, but the benefit had not, in the main, been passed on to the ultimate consumer, making a sharp readjustment of retail prices necessary to restore economic balance, President Schwab asserted.

There has been a liquidation in the cost of living, and we may regard this as a very happy sign, offsetting some of the hardship of part-time employment. Our employees have borne part of the burden of this situation. Just as business and investors have suffered loss of profits and diminished return from investments, so has the worker suffered a diminished payroll through part-time employment. We have maintained the wage rate and protected the economic position of the worker. He has full-time income when doing full-time work, but with curtailed markets and lower production it has been necessary, as we all know, to distribute the available work. What the steel industry has accomplished in distributing work and thus avoiding wholesale lay-offs among its employees is an unexampled achievement of management.

Figures which I have from representative plants report that there has been a gross average decline in the earnings of our employees of close to 25 per cent this spring as compared with a year ago when operations were still on a high level. To put it another way, the average man in these plants during March of this year worked 150 hr. as compared with about 200 hr. in March, 1930.

During the early stages of part-time work there was no alleviating circumstance to counterbalance this loss through part-time employment. An exhaustive investigation of the major items of living costs, however, indicates that this spring there has been a drop in many important items of the family budget sufficient to offset considerably the shrinkage of the pay envelope.

That I believe to be a very strong note of improvement in our general situation. The lowering of living costs means that the strain on the family budget has been lessened. The consumer will be able to catch up that much more quickly on his obligations. The load is being lifted off his mind through the very practical increase in his ability to pay. This increased purchasing power is going to loosen the fetters which

have been holding back potential consumption. This means that the purchasing power of our working force has been materially improved in the past few months.

Wholesale Prices Over-Liquidated

The second cloud across our vision has been the fear on the part of business men concerning instability of prices, particularly the fear of lowering prices. Before liquidation could be completed, this readjustment had to be made. Wholesale prices, as a matter of fact, had been trending downward, on the average, for 10 years with only occasional short-term rises. This benefit had not, in the main, been passed on to the ultimate consumer, and the sharp readjustment of retail prices was necessary before the situation was in proper balance. We have had that liquidation now in most lines. Retailers who have not made adjustments to the new price levels know their own situations and still have that step to make. But broadly speaking these readjustments have taken place.

When prices are out of line, price cuts will bring new business because they can be made without imperiling purchasing power which consists of wages, profits, dividends and other forms of income.

But once you reduce prices to a point where they destroy these forms of income you kill the goose that lays the golden egg. A price cut in an industry which is already operating below a reasonable profit level will not bring in another ton of business.

I believe that most of our industrialists have come to realize that. Copper, rubber, wheat, steel and similar basic commodities have been selling at distress prices which spelled a profit for no one; and, as a matter of practical experience, did not bring in volume business.

In our own industry we are very close to 1913 price levels, and even that is not a fair comparison, because today steel must be made to hundreds of exact, costly specifications, meeting the needs of our various consumers. Far better steel is being sold today at prices comparable to run of mill steel before the war.

As a matter of fact, slightly improved price levels in steel occurring at the beginning of this year were coincident with the first improvement which we had had in many months.

The last measure of what is a fair price, to me, is a price for commodities economically produced, and in their production paying a fair rate of wages to the labor involved and then a varying amount, depending on the class of business, for a return on the monies required in the business and the risk taken. In short, the price of any commodity must cover the cost of plant and materials, and a fair return to capital and labor. A great excess over that amount is destructive to trade, and a decline under that amount is even more harmful.

Now, gentlemen, I believe that we have fairly recognized the chief difficulties in our situation. I do not see any other clouds which need to be dispelled. Our financial position as an industry is in good shape. Current earnings statements have been disappointing, but there has been no note of concern with respect to the cash position, resources, or other factors affecting the stability of the leading companies in our business.

Less Distress Than in Other Depressions

This is a much better situation than we have faced in many of our business recessions. I have seen 50 years of American industry, and have witnessed the hard times of 1893, 1907, 1914 and the more recent depression periods. People who say that business learns nothing from the past are simply too young to know what they are talking about.

In 1893 there was almost complete business stagnation. There were millions of people who literally did not have enough to eat and there was bloodshed and rioting and general turmoil in our social structure.

In 1907 the business panic was so bad that there was actually no money available to meet payrolls in many cities, and business was done on the basis of I. O. U.'s.

In 1914 the unrest caused by the war was so severe that the Stock Exchange was closed, and business everywhere was virtually at a standstill. We forget these things.

We forget, as Secretary Mellon so wisely pointed out three weeks ago, that we are paying now for the cost of the largest war in history. We went through a period of unbalanced expansion, a condition which is being adjusted. The point which is particularly encouraging today is that we have met this situation with much less fear, less distress, and with much more organized intelligence than in any previous period of hard times.

Need Common Sense in World Trade

The suffering and ill effects of the war have been international. There has been a tendency for nations to be hysterical in erecting economic barriers. I am happy to say that there is evidence of a more sane attitude, a growing ability to recognize that trade between nations can flourish only on a basis of mutual advantage.

We sell the bulk of our goods to the home market; and, therefore, our greatest concern is with our national prosperity. Nevertheless, we must recognize that business is international and will become increasingly so. We cannot escape being influenced by world conditions. Most of the countries of the world have already had their period of liquidation, some more violently than the United States, and are on the road to improvement. The return of buying and selling between nations will give renewed vitality to our commerce. We must recognize that international trade, as well as national, can thrive only under conditions of proper balance. One of the constructive results of the present period has been a sharper scrutiny of uneconomic barriers and a better understanding of the essentials of trade relationships. We are trying to learn common sense at home, and we have got to apply it in trading with our neighbors too.

Overhead Costs Reduced

The housecleaning in our industry has been thoroughgoing. I know of no period in which there has been so thorough a study by our executives of every

(*Concluded on page* 1780)

CONTROLLING FURNACE COMBUSTION AND THE QUALITY OF STEEL MADE

CORRECT proportioning of the supply of oxygen (from the air) to the requirements of the fuel being used is becoming more and more a factor in open-hearth operation. General principles and specific applications are brought out in this report from the open-hearth men's recent meeting in Chicago. When a mixture of fuels is used the problem becomes more complicated, but the principles remain the same. The progress made in the past three years marks a long step ahead in the American steel industry.

OPEN-HEARTH furnace control, in its many ramifications, formed the chief topic of discussion at the second day's sessions of the open-hearth committee of the American Institute of Mining and Metallurgical Engineers, at Chicago. The talk centered mainly in two topics: control of combustion conditions and control of steel quality. Report of the first day's session was covered last week (page 1685).

How Waste-Heat Boiler Output Is Credited

BELIEF that the use of recuperators, either with or without double-pass checkers, is a step ahead of the use of waste-heat boilers was expressed by one open-hearth superintendent. He spoke in discussion of the method of crediting the production of steam in waste-heat boilers in steel mills. He feels that the heat can be better utilized directly in the open-hearth department, rather than to send it in the form of steam to other departments for use there.

This point of view was not accepted by some of the other members, who argued that the heat taken up by waste-heat boilers is a by-product of the open-hearth operation in somewhat the same sense that tar, ammonium sulphate, benzol, etc., are by-products of the distillation of coking coal into coke.

Practice regarding the credit for this steam is varied. The view appears to be fairly general, however, that the open-hearth department should be paid for the steam, either on the basis of the actual steam flow or on that of the fuel which is saved through this means.

Some plants operate on a transfer of credit, in which the steam from the waste-heat boilers is offset against air for air lines throughout the open-hearth department, for instance. In other cases the open-hearth gets credit for steam furnished and a corresponding charge for the steam which it uses. One operator said that, inasmuch as waste heat boilers represent a certain capital charge, the credit for the steam made in them should be regarded as a return on the investment in the equipment. On this basis the equipment is generally expected to pay for itself within a period of five years or less.

Pit Practice

OPENING the discussion on pit practice, one operating superintendent divided the topic into four main parts—preparation of the ladle, preparation of the mold and pouring into it, preparation and drying of stoppers and preparation of the nozzles.

He particularly advocated for ladles use of a monolithic lining in place of the customary inner layer of brick or in addition to the brick. He said that this is easy to patch whenever an area becomes worn, and that it makes a brick lining back of it last four or five times as long. It is inexpensive in application and maintenance and it is not necessary to disturb the brick lining in removing a skull from this monolithic surface. He reported going as high as 140 heats to the lining and averaging about 125.

Answering questions, the speaker reported this lining to be impervious to the attack of steel, but the opinion was expressed that this depends upon the kind of steel made. The advocate of this process is running a steel foundry, and some of the steel mill men thought that such a lining would not be impervious to attack and disintegration from the grades of steel customarily made into ingots.

Cement Gun Used on Large Ladles

Loam is the primary ingredient of the monolithic lining discussed. Ground brick and old sand, together with occasionally some fire clay, make up the remainder. The proportions are about four of loam to two of ground brick and one of sand. Because of the small size of the ladles in which this

is employed it is put on by hand. Use of a cement gun was recommended for larger ladles.

Another operator, also making steel castings, reported the use of a monolithic lining put on with a cement gun to a thickness of about ½ in. over the brick lining in the ladle. He uses the proportion of three parts of clay to one of sand and one of coke braize, and has been employing this for about 15 years. He finds it expedient to build up the slag line, again using his gun, after each heat. It appears that the slag attacks this form of lining much more actively than does the steel.

Steel mill operators reported the washing off of this type of lining in certain grades of steel, with the production of a scabby surface on cold-rolled sheets and full-finished sheets. One man stated that the lining comes off on the first heat of rimming or live steel. He expressed the opinion, however, that it probably is a good thing on foundry steel or killed steel, and said that it works all right in a hot-metal transfer ladle.

Progress of Combustion Control

A REPORT prepared by Major James W. Mills of the Granite City Steel Co., chairman of the combustion control committee, was read in his absence by the secretary, W. E. Buck, metallurgist of that company. Machine control of combustion was said to have consolidated its position very considerably during the last six months. In the Chicago district, in particular, much experimental work has gone on in this respect in connection with the use of various gases and various mixtures of gases. Adequate engineering was stressed as a prime essential in using anything of this sort.

Chief benefits to be expected from the use of a properly designed system of combustion control include a decrease in the fuel consumption for a given tonnage of product, an increase in the weekly capacity of the furnace, and an increase in the life or length of campaign of the furnace. Besides this, certain intangible results have been observed. These include better operating conditions, assurance of greater uniformity in the steel and better quality.

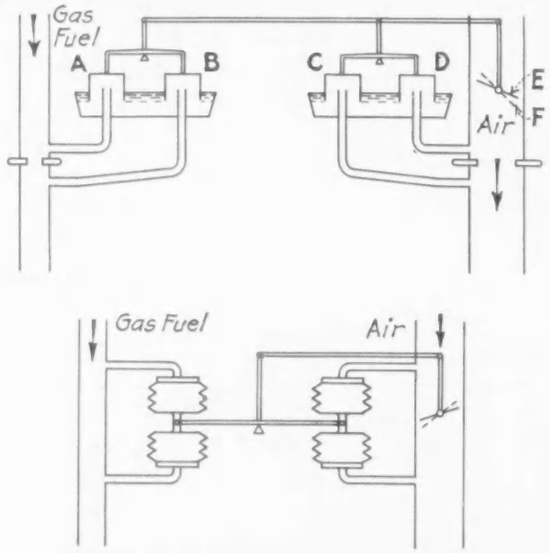
Amortization of the cost of the equipment within a period of one year was reported to be common. This is figured from the tangible results achieved, with sometimes some allowance for the intangibles.

Fundamentals of Combustion Control

FOLLOWING this report Prof. W. Trinks, Carnegie Institute of Technology, Pittsburgh, gave a thorough discussion of the whole problem of combustion control. He purposely avoided going in to the particular systems advocated by various engineering and other companies, confining himself chiefly to fundamentals.

Little was heard of the matter before 1928, but progress since that date has been very great. A number of items came up for control in any such system.

We can easily control pressures. Excess pressure causes products of combustion to leak out at various places and through scorification or actual burning



SCHEMATIC representations of the bell method and the diaphragm method of proportioning air to fuel. If gas supply increases the damper (*E* in lettered cut) opens wider—to *F*, and similarly in the other case.

makes it necessary to make frequent repairs. Gases are lost with their heat contents, and the brick expenses are high. On the other side, a slight vacuum causes cold air to enter through the doors and other cracks, and makes it impossible to get the highest preheat temperatures from the regenerators.

Temperature control divides itself into two factors—those dealing with temperature and those with time. Control of temperature with respect to a heat in the furnace will see to it that the two ends of the furnace are working about equally. It takes longer to make a heat with one end of the furnace relatively cold and the other hot.

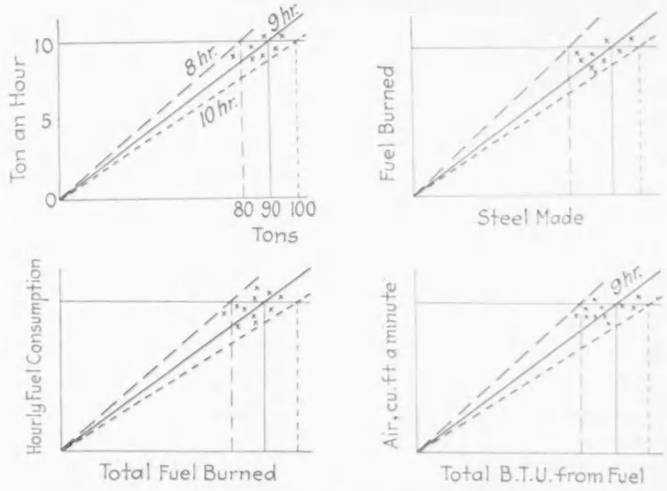
Furnace atmospheres can be controlled as among oxidizing, neutral or reducing conditions. Chemical reactions within the laboratory are greatly affected by the atmosphere in which they take place.

No attempt at control of furnace atmospheres was made until by-product coke gas became available. The results of the first installation for this purpose were disappointing, mainly because the engineers had not realized the utter necessity of absolute tightness in the checkers. It has been found that a measurement of air substantially needs a pusher fan, in delivering air to the furnace. Exhaust measurements do not give the proper results.

Open-hearth control is a subject which had to be sold to the management on the basis of saving money. It was necessary to prove that the equipment would save in fuel and wages enough above the maintenance charges so that the initial cost could be written off.

Magnifying the Small Indications Is Necessary

Pressure control requires some form of relay system (usually electrical) for magnifying the pressure differences. These differences in various parts of the furnace are a comparatively small portion of an atmosphere. Furnace structures, being



GRAPHIC representation of open-hearth furnace operation, whereby furnaces and crews and other variables may be visually compared as to performance. The small crosses show how individual observations may be plotted in, for this comparison.

essentially of leaky brickwork, will not allow differences greater than about 0.02 in. of water pressure. From this situation it follows that we must control pressures to within 0.002 in., or even less.

Temperature control must be cyclical throughout a heat. There is no method yet possible, nor likely soon, by which this can be made wholly automatic. It is possible, however, to control both ends of the furnace so that they will run alike, through the fuel supply and the reversing equipment.

Pyrometers for measuring temperatures have been tried in various places. They gave a very short life in the port ends and were moved to the slag pockets—moved further down into the down-takes, and then moved over into the regenerators. Still they gave a short life because of the high temperatures to which they were subjected. Finally they have been put in the flues or sewers beyond the regenerators, and have proved there to have a sufficiently long life for practical purposes.

Can Control From Flue

Control of temperature from that in the flue or sewer beyond the regenerator has been found adequate to give a uniform furnace temperature. Measured temperature alone cannot be so used, but the difference between the temperatures on the two ends of the furnace can be readily used to control the reversal time. It has been found better to have this reversal time made automatic, rather than to use a system of lights automatically controlled, and then have the reversal done manually. In case a thermostat installation should burn out, an automatic time-reversal arrangement would be a convenient standby.

Atmospheric control may be achieved either by proportioning the fuel to the air by flow measurement or by proportioning them on the basis of analysis of the products of combustion. Two general methods of proportioning by flow measurement were shown on the blackboard by Professor Trinks and are here reproduced by sketches.

In the sketch showing the method of operation by means of bells, a heavier flow of gas down the pipe at left would tend to release bell *A*, tilting the mechanism at the knife edge between *A* and *B*, and then through the system of levers opening the air damper in a manner and amount about proportional to the increased flow of gas.

Of course these impulses from gas flow, etc., are very small and the system is not interconnected, as shown on the sketch. There are electrical relays through which tiny impulses are magnified many times, so that the friction in the damper may be overcome. However, the sketch shows the principle. Of course, a slackening in the flow of gas would have the reverse effect, and tend to close the damper a little more than shown by the solid line.

In case diaphragms are used, as shown in the second sketch, these diaphragms are mounted upon bellows, the other ends of which are on fixed bases through which the pressure pipes enter the bellows. The action is precisely the same as before, minute pressure differences being multiplied many times in the apparatus and the damper correspondingly moved.

Both of these methods give very good results when using such clean fuels as coke oven or natural gases. Difficulties are experienced, however, with producer gas, because of the tar and dust carried along with it. Hence, it is desirable here to control the flow of coal to the producer or the air sent through the producer, or to control the flow of gas by means of the steam used.

When using fuel oil or tar as a furnace fuel, the varying viscosity of the fuel introduces complications. Instead of a flow meter or flow indication, a positive-displacement pump must here be used, and it must act as a meter. The flow of air then will be made proportional to the speed of the pump.

Must Permit Manual Operation

All controls for proportioning fuel and air to a furnace must contain means for varying constants manually. They must permit changing to a reducing or an oxidizing flame, as requirements demand, and they must allow for such conditions, for instance, as the lime boil, when the rapid evolution of carbon dioxide calls for a lower supply of fuel to the furnace.

All of these matters become somewhat complicated when a mixture of gases is used. It is necessary to adjust the air separately for each gas in the constituent flow.

Proportioning through the use of flue gas analysis is a somewhat different problem. Whatever filter is used must remain open and unclogged for a long time without requiring attendance. This can be done under proper conditions.

Fuel consumption has been found to be a minimum when the oxygen in the regenerators and flues is between 2½ and 4 per cent of the total gas. The time lag between gas analysis and resultant change in furnace conditions may be serious.

All atmospheric control is predicated upon the existence of a tight furnace. Slag pockets, regenerators and uptakes should be inclosed in steel plates to prevent infiltration of air. Even the furnace above the floor may profitably be similarly inclosed. This tightening up of the furnace will give a distinct benefit to the operating conditions, even without the mechanical or automatic system of control. The tilting furnace necessarily has gaps between the moving and the stationary portions which admit unknown and uncontrollable amounts of air.

Without the steel casing for any form of insulation used, it is impossible to make a furnace completely tight. Even with the best application of slurry there will be as much as 10 per cent excess air in the downtakes, and 22 per cent in the exit from the regenerators.

How It Affects the Crew

The open-hearth operator can get as good results from his furnace, through the use of control apparatus and a poor crew, as he can obtain without the apparatus but with the most highly skilled crew available. As the introduction of control apparatus leaves the men free for more important duties, it works out into a dollars-and-cents basis, so far as the management is concerned.

Following this exposition by Professor Trinks of the fundamentals of furnace control, W. H. Shallcross of the Shallcross Control Systems Corpn., Milwaukee, talked about the particular methods his company uses along the same lines. He showed diagrams illustrating the operation of a furnace using a mixture of two fuels and indicated how the air supply for each fuel is separately proportioned along the lines outlined by Professor Trinks.

Showing Furnace Operation Graphically

A METHOD of plotting a number of particulars of furnace operation, especially those relating to fuel consumption and unit use of fuel, was explained by Joseph F. Shadgen of the Smoot Engineering Co., New York. Several of his blackboard sketches are reproduced here. An explanation of the first one will suffice to show the principles involved. Assuming a furnace making a heat of 90 tons in 9 hr., we have the solid lines shown in the diagram at upper left. Carrying the horizontal line across to the vertical at left of diagram, it indicates a production of 10 tons an hour.

Should this furnace be charged to as much as 100 tons, and operate at the same hourly tonnage, the diagonal line with less slant would indicate its average performance. This would be a 10-hr. run. Similarly, for 80 tons and the same hourly rate, the heats would be made in 8 hr.

Intermediate rates of operation, amounts of production, or time of making the heat, would be plotted as shown by the random spots. It thus becomes possible to make comparisons between similar furnaces, between night turn and day turn on the same furnaces, and between different crews. All of these comparisons can be visualized easily by this means.

In the one at lower left, where the quantity of fuel is shown up against the tonnage, we have a comparison of the specific heat needed hourly in obtaining the furnace results wanted. Comparing these first two diagrams with each other we obtain the one at upper right, from which we can measure the dollars spent for fuel in making steel.

Heat Transfer in Open-Hearth Furnace

Renewing the discussion as between the luminous and non-luminous flame—a discussion which was active at the meeting of the committee last fall—brought out the statement that the matter of heat transfer is a very complicated matter. Professor Trinks stated that it is possible to make just as good steel, and to make it just as fast, with a non-luminous flame as with a luminous flame. Luminosity means uncompleted combustion. For this reason a non-luminous flame is essentially hotter.

Regarding radiation from these flames, the opinion was expressed that a luminous flame never gives more than four times the radiation shown by the non-luminous flame. To make proper use of the latter, however, it is especially essential that the exact air proportion to the gas be had, and also that a measure of turbulence of the flame, under control, be obtainable.

Because of the stratification of outgoing gases of combustion, it has been found difficult to obtain proper readings of temperatures and proper analysis of the products of combustion without going a considerable distance from the furnace proper. With tight downtakes analyses can be taken in the fantail between the slag pocket and the regenerator. Without a tight furnace, however, samples have to be taken in the downtake, and above the charging floor, if they are to avoid the considerable flow of air coming in through cracks in the brickwork.

Burning Oil of Low Baumé Gravity

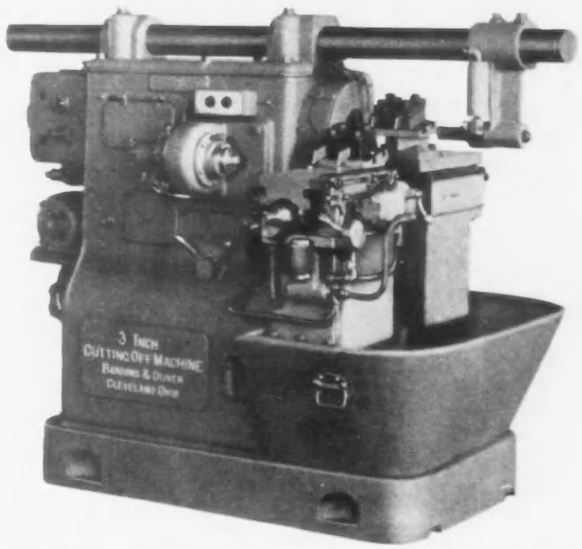
It develops that there has been a considerable movement toward the low-gravity fuels in the past few years. Some difficulties have been experienced in measuring these heavy oils, because of variations in their viscosity. These variations have shown up as much as 13 per cent. This makes it impossible to use the orifice meter without recalibration about every week. In doing this the oil is weighed against the meter at intervals of 20 min. and the flow checked.

One plant where the heavy oil is used employs a return system through which the oil is kept in motion all the time. In this instance the meter readings are checked against the tank readings.

In response to questions, several operators reported having noted no change in the iron oxide content of the slag with the heavier oil, as compared with the lighter oil previously employed. In some instances better operating results were reported. One man stated he uses a smaller quantity of oil, to the extent of about half a gallon, to the ton of product. He does find it harder, however, to obtain complete combustion when using a cold charge. The advantage is largely in the lower unit cost of the oil used. He finds a saving of about 40c. on a ton of ingots, from using 8 to 10 "heavy" Baumé oil, compared with 18 to 22 deg. oil previously used.

(To be concluded)

Production of Cutting-Off Machine Increased by Hydraulic Feed



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A NEW automatic cutting-off machine featuring increased production and quicker set-up through hydraulic feed, double slides, wider speed range, accessibility and ease of adjustment, has been placed on the market by Bardons & Oliver, Cleveland. The machine is built in two sizes, having 3 and 4½-in. capacity, respectively, and in general design is similar to the company's larger type of semi-automatic cutting-off machines, the development of which, in capacities up to 16-in., has covered a period of more than 20 years.

The hydraulic feed makes set-up quick and simple; also removes the most frequent cause of break-downs through the elimination of gears, clutches and cams from the feeding mechanism. The cushioning effect of the hydraulic feed permits heavier feeds without damage to cut-off tools, thus greatly increasing production.

Two hydraulic pumps of simple construction are provided. The pump which feeds the slides is driven directly from the spindle, so that feeds are obtainable in thousandths of an inch per spindle revolution. The other pump, operating the rapid traverse, is driven directly from the motor so that the speed of rapid traverse remains always constant.

A single valve controls the feed, rapid traverse and rapid return of the slides. Quickly adjustable trip dogs operate the valve when the machine is running automatically. A lever is also provided to operate the valve manually when setting up the machine or cutting off a few pieces only.

Any feed from 0.0001 to 0.04 in. per spindle revolution by ten thousandths is obtainable instantly by turning one graduated dial. No relief valves are required in the hydraulic feed circuit to make operation safe, and a careless operator cannot damage the machine by jamming the slides. As no relief valve is used, there is no tendency for the oil to overheat.

Two tool slides, one front and one rear, with cut-off blades cutting simultaneously, reduce the cutting time to one-half of that required on a single slide machine; or one slide may be used for chamfering while the other slide is cutting off. The action of both slides is geared positively together, insuring an equal rate of travel for each slide, so that the cutting is equally divided between the two cutting-off tools. Independent screw adjustment and multiple tool holders are provided for each slide. When lengths under 6 in. are to be cut off, two or more pieces can frequently be cut at one time.

The spindle speed box is a self-contained unit. Four selective speed changes in geometric progression, with a high and low ratio of about 4 to 1, are obtainable through sliding gears. This range furnishes accurate enough speed selection for short run work. Pick-off gears are also provided for long run work where a closer selection of speed is desirable. The pick-off gears are held in place by a cover plate which can be removed by turning a single knob so that the change can be made in less than one minute.

The spindle and all speed box shafts are mounted in roller bearings. Spindle speeds of 1200 r.p.m. or more are obtained without damage to the machine or excessive noise. Feed dial, speed change levers, and electrical controls are conveniently centralized within easy reach from the operating side of the machine.

The patented roller bar feed mechanism handles long or short work satisfactorily. The bar can be fed out 10 ft. or more if desired. This, it is pointed out, is not possible on machines using pushers with a limited length of stroke. The air operated collet, of hinged type, will grip thin wall tubing without distortion. False jaws for different diameters may be quickly changed without removing the collet.

An overhead adjustable stop arm leaves unobstructed passage for chips and parts to the pan. An air cylinder automatically withdraws the stop from contact with the stock immediately after the collet closes. The large one-piece chip pan has a screen in the bottom so that the coolant drains back into the sump provided in the base. When filled, the whole pan may be lifted out of the machine for emptying, handles being provided on each side for this purpose.

The main drive motor is mounted in the column. A separate motor, mounted on a bracket at the rear, drives the roller bar feed and coolant pump.

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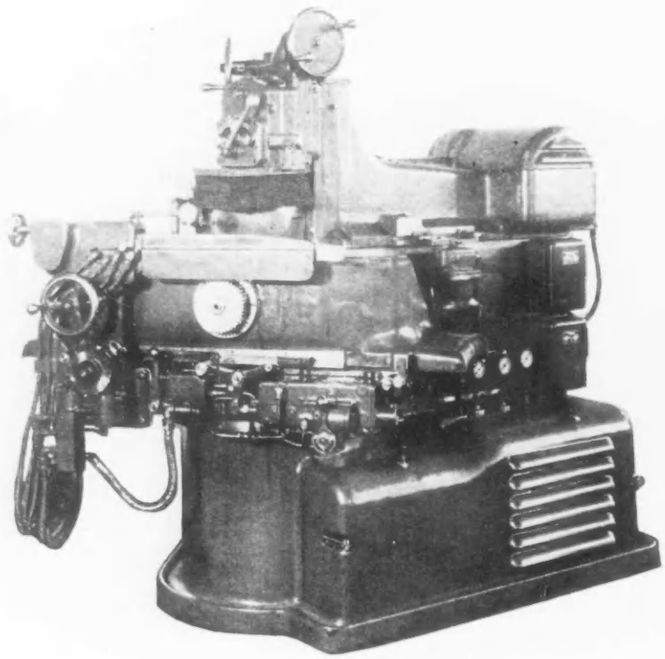
Light-Weight Chipper Operated by Air

A NEW device developed by the Madison-Kipp Corporation, Madison, Wis., is known as the Kipp air chipper. It operates at air pressures of 60 to 100 lb. Over 6000 blows a minute are delivered to the chisel through a turbine-valve-hammer mechanism. The resultant rapid, pulsating effect to the chisel provides an even flow of power when the chisel is pressed to the work by the operator.

Intensity of the chisel strokes or blows is regulated by the pressure the operator exerts against the chisel and also by the position of the trigger valve. The operator, therefore, has extremely close control of his work, so that he may work to a line and stop at a line.

The Kipp air chipper not only has a pistol grip, but also has a body or housing actually pistol shaped. Chisels are inserted into the barrel and held there by means of a spring clamp. The chisel shank sections are pentagon and the chisel may be inserted with any of the five sides in an upward position. The chipper itself will operate in any position.



Spur and Helical Gears Finished Rapidly by New Hydraulic Grinder

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A HIGH-SPEED 10-in. hydraulically-operated gear grinder that will correct errors of 0.0002 in. or less has been brought out by the Pratt & Whitney Co., Hartford, Conn. This machine, intended for commercial application, is designed for finishing either spur or helical gears, hardened or unhardened.

Capacity specifications are: Pitch diameter, 10 in. maximum and 1 in. minimum; diametral pitch, 3 maximum and 16 minimum; pressure angle, 13 to 30 deg.; and helix angle, either right or left-hand, 45 deg. Maximum width of face for spur gears is 6 in.; for helical gears the width of face that can be ground may be less than 6 in., depending upon the helix angle. The wheel diameter is 12 in.

There are two general methods of grinding gear teeth, by a formed grinding wheel, which is similar in principle to form milling, or by a wheel whose active form represents the side of a flat-sided basic rack. The latter is the method employed in this machine. Instead of a single flat-sided wheel, however, the machine uses a wheel having both sides trued to a cone which corresponds to the basic rack, thus permitting the grinding of adjacent sides of two teeth in one operation.

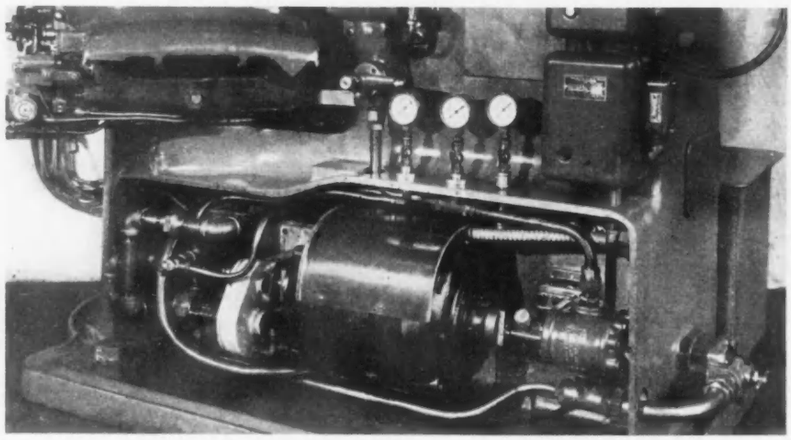
The grinding wheel is carried back and forth through the teeth by a reciprocating horizontal ram similar to that of a horizontal shaper. The stack of gears being ground is mounted on an arbor held between centers. Rotation of the work is controlled by a master gear and rack so that the wheel always engages the work, tooth for tooth with the engagement of the master gear and rack. As many passes of the grinding wheel per tooth may be made as necessary to obtain the finish required. Indexing of the work is automatic, and the machine stops automatically when all teeth are finished. An ample stream of coolant to the wheel and work is provided.

The grinding wheel ram, driven by a 2¾-in. piston motor, can attain speeds up to 50 ft. per min.; the motion is smooth and reversing of the ram, even at full speed, is accomplished without perceptible shock. Oil reaches the ram motor through a reversing and speed-control valve on the right-hand side of the bed and exhausts through the same valve back to the tank.

Maximum ram stroke is 6½ in.; length of stroke is adjustable by two dogs which operate the reversing valve. Weighing about 1100 lb., the ram assembly is held in position by its own weight. One V-shape and one flat bearing are used, the design being self-adjusting for temperature and wear. Ram bearings are pressure lubricated.

Dressing of the grinding wheel periphery to conform to the straight-sided basic rack of the involute system is accomplished by means of three diamonds, one in each of three sliding bars operated by a single lever. Two of these bars, intended for dressing the sides of the wheel, are independently adjustable by a vernier to angles from 13 to 30 deg. by minutes. The third bar, for dressing the outside of the wheel, is not adjustable.

Horizontal table drive is by an automatic reversing, 3-in. piston hydraulic



THE front quarter view at the top of the page shows the grinder with table swiveled for right hand helical gears. A double-end motor, in the close-up above, drives the coolant pump as well as oil pumps for the ram and other hydraulic motors.

motor. Mounted on bearings of the same type as the ram, the table has two speed ranges, slow for grinding and rapid for indexing; these speeds are changed automatically from one range to the other by means of dogs that operate a valve controlling the hydraulic motor. The slow speed can be varied for rough or finish grinding by moving a lever; independent variation of the rapid speed is obtained through a separate valve. When the work is finished, the table can be moved under power to the extreme right to facilitate loading and unloading.

The work spindle, mounted in large double-row preloaded ball bearings, is removable from its taper seat so that special spindles can be inserted for unusual work. The footstock spindle holds the arbor to the centers by spring pressure and may be moved by means of a lever at the side. The footstock itself is adjustable on scraped ways to accommodate arbors or work up to 14 in. in length.

For spur gears, the center line of the work is parallel with the ram movement, the work-slide moving perpendicularly to this center line. For grinding helical gears, the work-slide, mounted on a swivel base, is set to the helix angle of the gear to be ground, the ram movements remaining unchanged in direction. As before, the work-slide moves perpendicularly to the center line of the work. The helical gear is thus generated by the same combination of straight line and rotary movements as the spur gear. It is pointed out that, as there is no twisting motion, accuracy is as easy to obtain and maintain with helical as with spur gears.

Master Gear Controls the Work

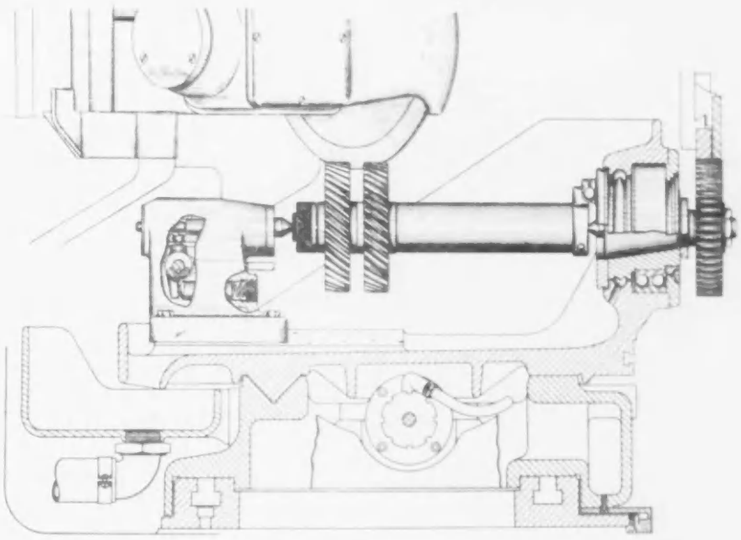
In number of teeth and diametral pitch, the master gear, mentioned above, is a duplicate of the gear to be ground. The pressure angles need not be the same, however. One three-piece master rack is required for each diametral pitch to be ground. It is mounted on an arm which pivots horizontally to lower the rack into mesh with the master gear carried on the end of the work spindle. The pivot is vertically adjustable to accommodate master gears from 1 to 10 in. P. D. Motion of the work past the grinding wheel is accomplished by the rolling of the master gear along the master rack.

Immediately above the master rack there is a slide on which are mounted two indexing racks. These are so placed that they are continuations of the master rack at each end. The indexing rack slide moves between adjustable stops and is moved the distance between two rack teeth at each end of the table stroke. It is operated by a hydraulic piston motor controlled automatically by a valve. The motion of this slide indexes the master gear and the work, each movement rotating the master gear one tooth. Indexing takes place at either end of the table movement while the master gear is out of mesh with the master rack, the work at the same time having rolled to one side out of contact with the wheel.

After each full revolution of the work, the hydraulic drive to all parts is stopped automatically by a ratchet wheel operated hydraulically. This wheel has the same number of teeth as the gear being ground and operates as an automatic knock-off after one complete revolution of the work. The entire hydraulic system can be instantaneously started or stopped by an emergency lever located at the front of the machine. All indexing, reversing and speed controls are hydraulic and are interlocked where necessary.

Power for the machine is supplied by two motors. The wheel spindle is operated through belt and idler pulley drive from a 3-hp., 1800-r.p.m. motor carried in a housing on the ram. The spindle speeds of 2215 and 2500 r.p.m. produce surface speeds up to 7000 ft. per min. The second motor, 3 hp., 1200 r.p.m., mounted under the cover on the side of the bed, is direct-connected to two geared oil pumps and one centrifugal water pump. This motor supplies power for the hydraulic system and for the coolant.

The gear grinder can be readily changed over for different gears. Of the parts previously described only the master gear, master rack, indexing racks and ratchet wheel must correspond to the particular gear being ground. Ease of operation also is emphasized, one operator handling several machines without difficulty. Floor space required is 66 x 82 in.; height, 67 in. The machine weighs approximately 5400 lb.



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SECTION view (above) through table and work spindle. The master gear and rack is at the right-hand end of the spindle.

Wheel dressing mechanism (right) with wheel guard removed. The dressing diamonds are adjusted to vernier angle scales by means of the handwheel shown at the upper right.

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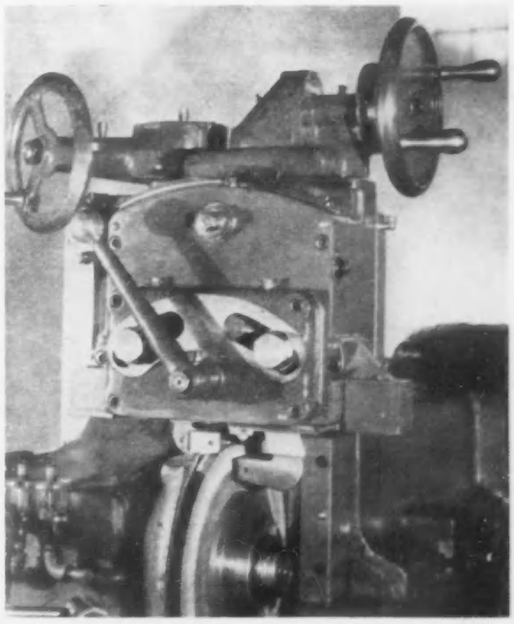

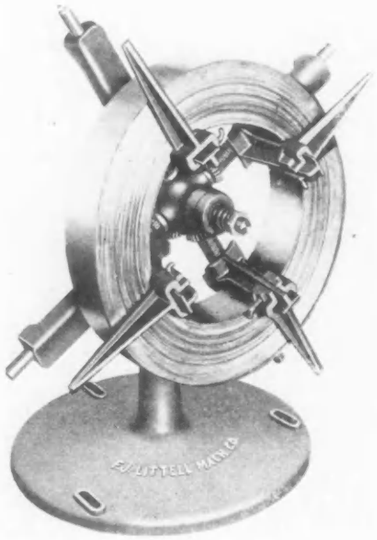

Coiled-Stock Reel Has Easy Running Features

IN the automatic centering reel illustrated, designed by the F. J. Littell Machine Co., 4127 Ravenswood Avenue, Chicago, for rapid loading and even unwinding of coiled stock to the feed mechanism of a press or other machine, sag or lost motion between the arms of the reel and the stock, as well as eccentricity of the coil, is avoided. It is pointed out that, as most coils, especially those of soft material, are more or less out of round, they tend to unwind with a jerking motion, resulting in an uneven feed to the machine. Though most important in the case of high-speed machines, the easy running reel will also improve the production of hand-fed presses. A ball-bearing hub further increases the ease of running.

After a coil has been run off, the operator pushes a hand-stop to lock the hub. Then, by revolving the posts, all four arms are moved toward the center, allowing a new coil to be slipped into place. By turning the posts toward the left, the arms are expanded to hold the new coil and, if necessary, to force it into concentric form.

The single type reel may be tilted to any angle and adjusted vertically as well. A double-automatic centering reel is also made. With this type one side may be loaded while the other is in use.

Coils can be handled weighing up to 500 lb., 6 in. or less in width and having a maximum outside diameter of 40 in.; maximum inside diameter, 20 in.; minimum inside diameter, 8½ in.

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Gage for Rotating Work Has Widia Contacts

THE Krupp "Mikrotast" snap gage, recently placed on the market by the Coats Machine Tool Co., 110 West Fortieth Street, New York, is intended for checking rotating as well as stationary cylindrical work. Lower anvil, back-stop and measuring contact lever are each provided with two contact pads of Widia tungsten carbide to resist the abrasion of moving work. The snap gages are made in five sizes, providing a continuous range of capacities from 0.787 to 4.724 in.

Any standard "Mikrotast" indicator may be attached to the gage as shown in the accompanying illustration. Indicators specially recommended are those having graduations of 0.0002 and 0.0005 in. with scale ranges of 0.006 and 0.015 in. respectively.

The lower anvil and the back-stop are adjustable to enable the gage to be set for the diameter of work to be checked. It is pointed out that by observing the motion of the indicator hand while the instrument is being applied to a master plug, it is possible to determine if the gage is properly adjusted to the exact diameter of the work.

Red tolerance markers on the indicator scale to the left and right of the zero division indicate plus and minus limits respectively. These markers are set by means of knurled nuts at the back of the indicator housing.

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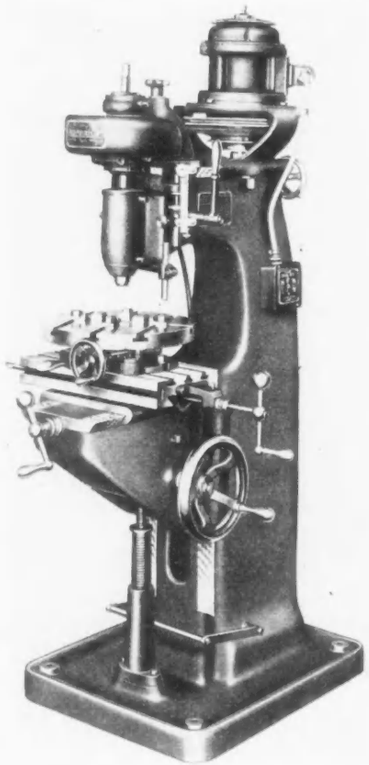
Airplanes manufactured in the United States during the first quarter of 1931, totaled 672, an increase of 87 over the number produced in the last quarter of 1930, according to report of the Aeronautics Branch, Department of Commerce. First quarter production for this year was distributed as follows: 342 for civil use, 302 for military deliveries and 28 for export.

Improved Vertical Miller and Router

AN improved router and vertical milling machine has been brought out by the Reed-Prentice Corpn., Worcester, Mass., for use in the manufacture of stamps, stencils, light dies and similar work. Replacing the horizontal motor and belt drive, previously employed, a vertical motor is mounted on the top of the column, which is made heavier to withstand the increased load. V-belts instead of round are used for the spindle drive and four-step pulleys



replace the three-step pulleys formerly used.

Heavy ball bearings above and below the spindle pulleys are designed to take belt pull independent of the spindle, thus assuring smooth, vibrationless operation at all speeds. In the spindle quill there are two deep-race ball bearings, designed for maximum capacity and mounted under an initial tension of 100 lb. These are intended to take radial and thrust loads.

The collet has been redesigned with a longer, more gradual taper and thicker walls. A hardened spindle bushing maintains the accuracy of the collet seat. The micrometer depth stop, also of improved type, is graduated to thousandths and is used in connection with a 2-in. vertical scale subdivided into tenths of an inch.

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Associated Machine Tool Dealers will hold its semi-annual convention at Granville Inn., Granville, Ohio, June 4 and 5.

Steel Warehouse Distributers Discuss Better Merchandising Methods

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BETTER merchandising methods, quantity extras on steel products, methods of cost reduction, and the introduction of new lines were among the topics considered at consecutive meetings held in Pittsburgh last week by the steel industry's two warehouse distributers' associations. The American Steel and Heavy Hardware Association voted to change its name to the American Steel Warehouse Association. The National Association of Sheet Metal Distributers, having been known up until last year as the Metal Branch of the National Hardware Association, met for the first time under its new name. Meeting at the same place on consecutive days was also an innovation for the two groups, and the idea met with such approval that it will likely be continued in the future.

As had been expected, both groups were forced to report rather unsatisfactory operating results during the past year, but the opinion was widely expressed that improvement can be expected before the end of the year.

Merchandising All-Important

Stressing the importance of sound merchandising methods to both manufacturers and distributers, G. F. Ahlbrandt, general manager of sales, American Rolling Mill Co., Middletown, Ohio, pointed out to the steel warehouse group that the paramount question of the steel industry during the next decade would be not how well it can produce, but how well it can sell. Constructive merchandising methods, he stated, will no longer be adopted as a temporary measure, but will become a permanent part of the policy of steel companies just as economical operating methods have been in the recent past. The industry will need competent distribution engineers just as it today needs competent production engineers, and the entire personnel of a company will be forced to become commercial minded.

Enlargement of present outlets, according to Mr. Ahlbrandt, is more important to distributers than to seek new outlets at the expense of competitors. He advised distributers to make present customers better customers before seeking new ones. Small orders, the speaker indicated, are just as important to distributers as heavier tonnages and should be cultivated for the sake of future large orders. In discussing the elimination of some of the warehouse industry's ills, Mr. Ahlbrandt opposed shipment by mills in pool cars and direct shipment by producers of small orders, and objected to the policy followed by some producers of making special price concessions to jobbers. The responsibilities of distributers are three-fold: First, to the company itself; second, to competitors, and, third, to their entire industry. In the latter case he mentioned the possibilities of mergers, believing that these can be successful only if the various activities of the combined plants are thoroughly organized. Merchandising really means translation of products into service, and service is the most important function to the distributing industry.

Improving Service

George S. Case, president, Lamson & Sessions Co., Cleveland, told the same group what bolt and nut manufacturers are doing to reduce their expenses and improve service. He stated that the basis for the economy which will do the most to bring back prosperity is the budgeting of expense down to the smallest detail. Saying that bolt and nut makers have been able to introduce economy without cutting the wages of labor, he pointed out that better schedules, improved equipment and better working arrangements have been largely responsible. These have all eventually led to better service to ultimate consumers.

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OFFICERS OF NATIONAL ASSOCIATION OF SHEET METAL DISTRIBUTERS FOR 1931-32

President, F. O. Schoedinger, F. O. Schoedinger Co., Columbus, Ohio.

Vice-president, A. W. Howe, J. M. & L. A. Osborn Co., Cleveland.

Secretary-Treasurer, George A. Fernley, Philadelphia.

Executive Committee: A. J. Luedke, Milcor Steel Co., Milwaukee, and George O. M. Johnston, McClure-Johnston Co., Pittsburgh, 1931-1934; F. J. McNeive, W. F. Potts' Son & Co., Philadelphia, and C. S. Harper, Harper & McIntire Co., Ottumwa, Iowa, 1930-1933; W. H. Bowe, Herrick Co., Boston, and L. D. Mercer, Republic Steel Corporation, Youngstown, 1929-1932.

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Changes in Business Methods

Urging the necessity for business to adapt itself to the rapidly recurring changes now characterizing industry, Dr. Frank M. Surface, assistant director, Bureau of Foreign and Domestic Commerce, Washington, declared that present-day methods are not as modern as present-day equipment. Cooperative thinking, Dr. Surface pointed out, must prevent the recurrence of a situation which makes 90 per cent of the profits of an individual enterprise dependent upon business conditions and only 10 per cent upon individual initiative and effort. He explained how the Department of Commerce is endeavoring to foster constructive business thought by supplying facts upon which executives may base their future judgment. Wasted effort is being eliminated by studying the problems of distribution, and the department is striving to show how present cost accounting methods in the distribution field can be supplanted by more accurate appraisals.

Business At a Loss

In a report of the association's cost of doing business committee for the past year, G. K. Conant, Sligo Iron Store Co., St. Louis, revealed that the 28 companies contributing to the survey had a net loss of 74c. on each $100 worth of business done in 1930. Gross profit declined very little, although administrative expenses, fixed charges, warehousing and handling, and selling expenses all rose sharply.

Various members told of steps taken during the year to reduce expenses, and mentioned such measures as wage and salary reductions, reduction of sales forces, shorter working hours and many other less drastic moves. Elimination of unprofitable lines also contributed to cost reduction, and some members were able to add more profitable new items to take their place.

New Field in Sheet Metals

The wide market for sheet steel awaiting distributers in the building field was outlined by S. A. Knisely, trade research division, National Association of Flat Rolled Steel Manu-

facturers, Cleveland. He stated that a recent survey reveals the potential market for flat steel products in the steel industry amounting to 7,000,000 tons annually. Architects are beginning to realize the possibilities of steel in replacing stone and masonry, and thinner insulated walls will undoubtedly soon come into greater use in office and industrial buildings. The steel house will also be a reality in the near future, according to Mr. Knisely, and the use of flat steel as a basis for highway construction has already been introduced. Distributers, he said, are in an excellent position to make the most of these markets, and manufacturers stand willing to cooperate with them in building up the business.

Walter S. Doxsey, editor, *Daily Metal Trade*, Cleveland, also stressed the possibilities of sheet steel in construction, and cited the potentialities of other sheet metals, such as aluminum, copper, zinc, etc.

Disagreement on Cutting Extras

As brought out in the reports of the various committees, disagreement as to a universal rate for cutting charges in warehouses continues to puzzle the association. Members are agreed that a generally accepted schedule is exceedingly desirable, but some favor rates based on material furnished, while others prefer to charge a different amount for each individual cut. The subject will again be considered by the committee next year in the hope that some satisfactory plan can be worked out.

The committee on cold-finished bars reported considerable direct mill competition in districts where smaller manufacturers are located, stating that these units were even willing to compete on orders of less than 1000 lb. It was indicated, however, that some of the warehouses are in the habit of ordering lots of 1000 lb. or less, and thus have accustomed mills to furnishing such small lots.

The report of the sheet steel committee cited the chief problems facing distributers, as direct sales by mills of less than carload lots, direct shipment on jobber accounts of less than carload items, shipments by mills of mixed carloads of warehouse items, and a lack of adequate quantity differentials. It was reported, however, that the mills are willing to cooperate with distributers in solving these problems, and a system of quantity differentials, varying in accordance with local conditions in each territory, was suggested. The committee on plates and structurals also reported difficulties in establishment of quantity differentials, and suggested a scale similar to that now in effect on bars. Such differentials now being widely used in the East were reported to have brought very desirable results.

Decision to petition mills for a restoration of the former 2 per cent discount to distributers on galvanized sheets and long ternes was reached at one of the sessions of the sheet steel group following considerable discussion. As proposed by F. J. McNeive, W. F. Potts Son & Co., Inc., Philadelphia, chairman of the association's sheet steel committee, it was decided to ask mills for this increase only on coated sheets which would return these items to the same basis as that now in effect on tin plate and terne plate. The present discount of one-half of 1 per cent on black sheets and other sheet mill products seems to be fairly satisfactory to jobbers. Little expression on the part of mill representatives at the meeting was forthcoming, but jobbers generally favored a return to the higher discount on coated material.

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OFFICERS OF AMERICAN STEEL WAREHOUSE ASSOCIATION FOR 1931-32

President, W. J. Holliday, W. J. Holliday & Co., Indianapolis.

First Vice-President, Guy T. Bible, Horace T. Potts & Co., Philadelphia.

Second Vice-president, Clarence C. Dodge, George F. Blake, Inc., Worcester, Mass.

Secretary-Treasurer, B. R. Sackett, Philadelphia.

Counselor, George A. Fernley, Philadelphia.

Executive Committee, (new members) Carrol C. Harvey, Arthur C. Harvey & Co., Boston, and Lester Brion, Peter A. Frasse & Co., New York.

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Simplifying Terne Plate Brands

In reporting for the association's committee on terne plate, Robert H. Lyon, Lyon, Conklin & Co., Inc., Baltimore, suggested a standardization of brands of terne plate as a means of simplifying sales on this product. In the discussion that followed it was indicated that manufacturers might be willing to stabilize on three brands of plate, with 40-lb., 20-lb., and 8-lb. coatings respectively. Some of the distributers expressed their willingness to give up their established brand names if this simplification could be arrived at, and others were inclined to give the matter serious consideration. It was pointed out that the wide divergence of brands and weights of terne plate had confused buyers in recent years, and had prevented expanded uses of this material for roofing in recent years.

Progress in Simplification

H. R. Caldwell, division of simplified practice, Department of Commerce, Washington, outlined the progress made in the last year in the simplification of sheet steel lines. He urged members to get behind a movement to identify all simplified products by means of some suitable stamp, and stated that mills were willing to cooperate along these lines.

New schedules of classification for sheet steel, which are to be adopted by the mills on third quarter business, were discussed at some length, and distributers present were inclined to regard the move as a very constructive one. Plans for a system of quantity differentials on sheet steel were suggested, and regulation of direct shipments of black and galvanized sheets, pool cars and mixed cars was urged. It was indicated that mills could hardly be expected to establish carload lots as a minimum shipment in times of such light demand, but distributers felt that examination of 25 bundles, with a limit of five bundles to an item, might well be established, with reasonable extras on smaller lots.

Varied Coating on Galvanized Stock

Pointing out that variations in zinc coating on galvanized sheets for roofing purposes, with consequent difference in wearing qualities, had seriously handicapped sales in the agricultural districts, J. D. Conover, American Zinc Institute, New York, presented the results of a wide survey conducted by the institute in determining the effect of zinc coating on the wearing quality of roofing sheets. He explained that roofs put on 20 or 30 years ago ordinarily carried a very heavy coating, ranging up to 3 oz. per sq. ft., and invariably gave long periods of service. Now, however, sheets with a coating of 0.8 oz. per sq. ft. are commonly sold, and in many cases are badly rusted in three to five years. This has led to misunderstanding on the part of the public, which was accustomed to long service for roofing of this sort, and Mr. Conover urged the adoption of some plan which would assure the buyer of the amount of coating received, and possibly establish a premium on material carrying a heavy coating, with consequent longer wearing qualities. He stated that such a plan had been successfully worked out in Canada, and, if adopted by manufacturers and sellers in this country, would undoubtedly lead to heavier sales of galvanized roofing material.

Copper Situation Improved

The efforts being made by manufacturers of rolled copper products to stabilize distributers' markets were outlined by H. B. McCrone, American Brass Co., Waterbury, Conn. He stated that manufacturers were conducting extensive advertising campaigns to promote the sale of copper products, and urged the adoption by distributers of suggested resale prices established by mills after a long study. A. W. Howe, J. M. & L. A. Osborn Co., Cleveland, reporting for the association's sheet copper committee, stated that conditions in this market had improved materially because of the cooperation of mills.

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WAGES

IT'S a poor industry whose product won't bring as much or a little more than its cost. So think James A. Farrell and Charles M. Schwab, outstanding figures of the steel industry. Both of them declared, at the recent meeting of the American Iron and Steel Institute, that steel makers should not expect labor to contribute toward making below-cost donations to customers. Wages should "stay put." Some process for hardening backbones is badly needed today.

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LIQUIDATION

"WAGES can be liquidated," says Charles M. Schwab, "without cutting wage rates." The process has been going on for the past half century. It's not what you pay per man hour that counts, so much as what you get from the hour you pay for. Improved machinery is the most effective wage and cost liquidator that has as yet been discovered.

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DEPRECIATION

DEPRECIATION rates as published by United States Bureau of Internal Revenue came in for adverse criticism by National Association of Machine Tool Builders at recent convention. Longevity rates on machinery established by the Government might have been O. K. 25 years ago, but are out of step with modern ideas of obsolescence. An insurance actuary who estimated the probable life of individuals as from two to three times its actual span would either "get the gate" or put his company out of business. But taxpayers pay for governmental mistakes.

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SMALL ORDERS

G. F. AHLBRANDT, general manager of sales of *Armco*, stressed importance of small orders at recent meeting of the steel warehouse distributers. They may lead to big ones. "Distribution engineers," said Mr. Ahlbrandt, "will be needed in tomorrow's industry as much as production engineers are needed today."

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CONGRESS

"NO extra session," says President Hoover. "We cannot legislate ourselves out of a world economic depression; we can and will work ourselves out."

If work will do it, there should be no shortage of help under present day conditions!

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Also in This Issue—

Automotive Business Expectations

I. C. C. Ruling on Cast Iron Pipe Freight Rates

Spring Meeting of Machine Tool Builders

Government and Business Discuss War Prices and Profits

April Employment Down 0.35 Per Cent

April Commodity Average Falls to 73.3

Program of Iron and Steel Engineers

Farrell, Schwab and Thomas on Steel Business

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NEIGHBORS

NEW YORK may be the gloomiest spot on the map, but its next door neighbor, Newark, N. J., is an optimist. Newark Chamber of Commerce announced that the output of its industrial area for 1930 passed the billion dollar mark for the first time. And this without the addition of many new industries.

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STANDARDIZE

EXTENSION of standardization is urged by Dr. Julius Klein as an economy move. He states that 120 industries are saving $250,000,000 in annual cost of making and selling through simplification already accomplished. There is room for more.

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PROFITS

REDUCTION in bank rates made recently has not perceptibly stimulated business. Decrease in price of money and price of products are not as effective in restoring confidence as would be an increase in profits. Hence the logic in approaching prosperity through cost reduction.

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INDUSTRIAL OUTPUT

ACCORDING to Federal Reserve Board, industrial production covering both manufacturing and mining, rose 1 per cent in April, according to the seasonally adjusted index. It is now at 89, compared with last December's low of 82. The 1923-25 average represents 100.

EUGENE P. THOMAS

MUTUAL CONSIDERATION IS PRIME NEED

By EUGENE P. THOMAS

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I FOUND on my desk this morning a message, issued in circular form by one of the large steel associations, which is significant of the discussions and deliberations of this institute:

"If every member of the steel industry would begin today by issuing positive instructions that every estimate must carry a profit and that the first bid submitted will be the last and final quotation, the industry would find itself turned overnight from red ink to black and that would mean prosperity for all."

This gathering should bear eloquent testimony to the inspiration in collaboration to mutual benefit, were not self interest the always unfortunate dominating factor. There is really little difference—from the Homeric struggle through medieval centuries when men were ruled by the law of the jungle that "might makes right" to the present debacle of internecine strife and discord in competition.

The spectacle of the greatest industry in the world, admittedly so by reason of its being inherently the backbone of our civilization, engaged in a contest of gratuitous dissipation of raw materials and impairment of investments has probably been ununequaled since the beginning of this century.

It reminds one of the old Persian fable of the traveler approaching Teheran and overtaking a nemesis in the guise of a harbinger of death on the way to devastate that great Persian city. Acquainted with her purpose, the traveler expostulated against her plans and eventually obtained a promise that, instead of destroying 30,000, she would limit her decimation to 10,000 souls, but as the days passed deaths continued until the 30,000 had been reached. The traveler upbraided this destroying angel, or death-dealing demon, with failure to keep her promise, but she said, "I did keep it. I killed 10,000 and the other 20,000 died of fear."

The situation of the country today is not so desperate as pessimists would paint it. Indeed, in many parts of this country it would be difficult to find any trace of the mental depression that exists in the large centers.

Must Come Down to Earth

There is no better index of market conditions than that of car loadings, and we find there is a reduction of only 18 per cent during this year to date as compared with the similar period last year, or 23 per cent under the boom year of 1929. We should pause and reflect that here is no cause for depression or giving goods away in the futile effort to pull up a subnormal demand by its bootstraps to abnormal individual production.

Car-loading figures reflect a fairly normal, steady, stable volume of business, but slightly under a previous five-year average. We have been attempting to gild the rainbow by setting up as an invariable criterion the most hectic days of prosperity. We must come down to earth and realize that, with international complexities weighing down upon us, we can only look forward at present to a steady, moderate volume of business from which can be extracted reasonable profits based on prices fair to the manufacturer and fair to the consumer.

Challenges Economist's View

An economist has recently said that falling prices encourage consumption and rising prices check consumption. Like many dogmatic doctrines, these aphorisms are not necessarily truisms. Call it a phenomenon if you like, but the history of the steel business is that advancing prices encourage demand and that falling prices discourage consumption. If it could be predicted with assurance today that the average of all selling prices would shortly advance even $2 per ton at a given time, say two or three weeks hence, there would be a scramble for coverage for the third quarter by reason of depleted stocks, empty warehouses and liquidated inventories. If it were assured that at a given time freight rates would be advanced, with the inference that the buying power of the railroads would be thoroughly restored, there would be an immediate effort on the part of every manufacturer and consumer in the country to lay in stocks of material against the impending advance. These two elemental factors operating together might lift the miasma of depression overnight.

In this country we rely upon individual initiative and not on Governmental assistance. In cases where supposed relief has been fostered, such as in farm products and the merchant marine, disastrous results have occurred. We do not require paternalism, but we do ask to be let alone. We do not demand Governmental assistance, but looking overseas to the great collective coordination of the forces of the government, banks and industry, we are naturally impelled to resent inquisitorial methods designed to harass proper and legitimate cooperation in business.

Pleads for Sense of Mutual Welfare

For a quarter of a century past, hearty applause has greeted repeated admonitions and warnings of leaders of the industry who have endeavored

THE steel industry is dissipating raw materials and impairing its investments on a scale unequalled since the beginning of the century, declared Eugene P. Thomas, vice-president, United States Steel Corpn., in an address before the American Iron and Steel Institute in New York, May 22.

Disputing economists, he argued that an advance in steel prices and an increase in freight rates would be powerful influences for business recovery.

Voluntary cooperation to mitigate destructive competition is imperative, in his opinion, although such collaboration should be without government assistance or interference.

to inculcate sound principles of cooperation. The destructive results from bitter competition, fostered by the desire to obtain an excess proportion of the business available, regardless of cost, might persuade the pessimist of the futility of expecting cooperation, were it not for the enduring optimism of those who stubbornly cling to the hope of returning sanity.

These associations and discussions should be an enduring incentive to a loyal adherence to, and practice of, those precepts of mutual consideration and tolerance which are essential to permanent success. Reflection must convince us that by this means advantages are attainable even during partial employment of plants with reasonable though reduced profits; while the public also profits from all the benefits arising out of stable conditions and consequent larger usage of the products of the structural steel industry.

The progress of time has brought a finer comprehension of our responsibility to each other and to our industry. The spirit of fraternity, the realization of interdependence, leavens modern society, inspiring commendable effort toward a clearer perception of the advantages of cooperation within permissible limits.

Some of the evils of competition will always be with us, but mitigated, it is hoped, by a rational conception of ethical considerations and by mutual welfare. It were Utopian, perhaps, to expect that, under the lash of the modern drive for business, inconsiderate competitors would refrain from attempting to operate to larger capacity than commensurate with consumption, or that supposed supersalesmanship at times would not resort to indiscriminate price cutting.

In our steel industry we are too prone to regard a temporary depression or set-back as evidence of a permanent condition. A right sense of proportion enables us to take the long view. Instead of keeping our eye only on the record-breaking achievement of a year such as 1929, when hectic enthusiasm and unrestrained expansion pursued their riotous course, we should take a cycle of some five years' period as a basis for making comparisons.

The Long Perspective

Applying this method to our industry, we find that the annual average gain in steel production, over the last 25 years, has been 2,000,000 tons. For each year in which steel production has declined, there have been two years of increase. The long-time trend points continually upward. An occasional surplus of capacity over consumption should merely present an intriguing challenge to overcome temporary slackness of demand by more intensive research and collaboration with our customers and with one another. Our present depression is not one of dark clouds, but of clouds with a silver lining.

We live in spacious times, in a wonderful era. Its most astonishing revelation has been the development of the steel industry. Within the narrow confines of the last quarter of a century, there is comprised more real progress of lasting benefit to humanity than in all the preceding ages. With this phenomenal advance has come a wider diffusion of those things that minister to man's contentment. The steel industry never loses sight of the fact that industry and humanity are linked together in the rapid progress of these later times.

The steel industry should be carried on in the spirit once found by a man who put the same question to three workmen employed on the same job:

"What are you doing?" The first said he was working for so much a day; the second that he was chiselling granite; the third said: "I'm helping to building this cathedral!"

It is in this wider sense, in its relations to the unity of purpose of all human progress, that we take pride in the steel industry, and deeply deplore any deviation from its high standards. We take courage from the past and look forward with undimmed faith to a greater future.

Economic Significance of Materials Specifications

A joint session of the American Society for Testing Materials and the Western Society of Engineers will be held during the annual meeting of the A.S.T.M. at the Stevens Hotel, Chicago, on the "Economic Significance of Specifications for Materials." The session will be held Thursday evening, June 25.

The A.S.T.M. in this joint session will give to business men the impressions of five leading executives as to how specifications really do affect daily business. John Brunner, Illinois Steel Co.; P. Park, Pullman Co.; J. P. H. Perry, Turner Construction Co.; A. R. Lord, consulting engineer, and J. W. Bancker, Western Electric Co., will discuss the subject from the various angles of producers, consumers and purchasing agents. These addresses will introduce the subject, and the meeting will then be opened for general discussion from the floor.

The committee planning this joint session is composed of Zay Jeffries, consulting metallurgist, Aluminum Co. of America; E. S. Nethercut, director, Western Society of Engineers; G. E. Warren, assistant general manager, Portland Cement Association, and C. L. Warwick, secretary-treasurer, American Society for Testing Materials.

Wage Conference to Be Held on Bars and Sheets

Plans are being made for the annual wage conference to be held between the Western Bar Iron Association and the Western Sheet & Tinplate Manufacturers' Association with representatives of workers at Atlantic City. The sessions are scheduled to start the latter part of this month and to extend into June. Employees will act through the Amalgamated Association of Iron, Steel & Tin Workers.

The Amalgamated association has made a preliminary draft of the demands which are to be presented this year, representing a grouping of the requests submitted by the various constituent lodges.

Data for Users of Steel Barrels and Drums

A great deal of information useful to buyers and users of steel barrels and drums is contained in a new 56-page booklet just issued by the Steel Barrel Manufacturers Institute, Cleveland. The book lists and gives specifications covering material, construction, closures, markings and tests for various standard types of steel containers. The institute in preparing the booklet renders a service to buyers of steel barrels and drums in supplying them with information covering the requirements for containers as provided by Interstate Commerce Commission specifications. Included are also listed types of containers complying with government regulations for the shipment of inflammable and corrosive liquids, explosives and poisonous articles. Copies of the book may be had by applying to the institute.

"Frozen" Prices and No Profits Suggested as a War Time Policy

J. Leonard Replogle and Walter S. Gifford Give Advice to Government Commission

WASHINGTON, May 26.– J. Leonard Replogle, director of steel supply during the war, told the War Policies Commision that prices of war necessities should be frozen as of the date war is declared. Mr. Replogle's views accord with those of Bernard M. Baruch, former chairman of the War Industries Board, and others. But it is not in line with the proposed plans of the War Department, according to testimony given by General MacArthur, chief of staff.

"The issue of war," Mr. Replogle told the commission, "will largely be determined, as in the past, by manpower and weight of metal. Steel must be provided for ships, guns, shells, tanks, airplanes, trucks, cantonments, barbed wire for entanglements and for practically everything used for offensive and defensive warfare. The United States is particularly well equipped, having approximately one-half the steel productive capacity of the entire world."

Mr. Baruch, who previously appeared before the commission, also testified last Friday when the commission completed its hearings. It will meet again in the fall to begin preparation of a report on a plan for taking the profit out of war. Mr. Baruch's testimony supplemented previous evidence he offered regarding the freezing of prices at the outbreak of a conflict.

President Walter S. Gifford of the American Telephone & Telegraph Co., who was secretary of the War Munitions Board, forerunner of the War Industries Board, urged heavy taxation rather than price freezing. Mr. Gifford said price freezing would not take the profit out of war, but would seriously interfere with "the outstanding characteristic of the last war—voluntary action." He suggested that enough of the profits should be kept so as to disturb conditions as little as possible. He also suggested that the President revive the Council of National Defense by appointing industrial leaders who would keep in touch with the mobilization plans of the War Department. Mr. Gifford expressed the opinion that Congress should pass a resolution declaring it to be the policy of the Government that no profits would be made in future wars. Such action, he said, would give notice to those, if there are any, who might want war because of financial benefits. He opposed a suggested constitutional amendment authorizing the taking of private property without compensation. He likewise expressed opposition to the plan which would prevent Congress from declaring war without a referendum from the people.

Assistant Secretary of the Treasury Arthur A. Ballantine told the commission that the ideal war profits tax for a national emergency would bring to the Treasury the entire war profits. His testimony was accepted as being the Treasury Department view.

"Working out a carefully formulated war profits tax is a matter calling for the most careful effort on the part of some body of experts, who, uninfluenced by actual emergency conditions, could study the problem in the requisite detail and carefully formulate at least the framework of a statute which would be both workable and effective," said Mr. Ballantine.

He declared that because of the margin of error in the determination of profits of a business enterprise, because profits do not all or in the main take the form of money and the possibility of the destruction of the economic machine by taking more than the profits, the measure of the tax could probably not in practice be more than 80 per cent. So far as possible, it was stated, war profits should be broadly treated as excess income during a war year over pre-war income, the pre-war period to be the nearest representative period not vitally affected by conditions of the war. Mr. Ballantine said special temporary deductions would have to be permitted in the determination of the profits to take account of probable results of post-war deflation. With such allowances war profits, it was urged, should be taxed at a maximum rate. The amount of income remaining after the deduction of the war profits tax, it was stated, should of course be subjected to income tax rates framed to meet the then existing conditions. A war profits tax so conceived, it was stated, would probably eliminate war profits.

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NEW YORK SKYSCRAPERS IN SILHOUETTE

HERE'S how various New York skyscrapers compare with the new Empire State Building, which rises to a height of 1250 ft. The 85 stories of the Empire State Building are surmounted by a tower which carries the structure to a height equivalent to 102 stories. The second tallest building is the Chrysler Building, 1046 ft. or 77 stories high. The Bank of the Manhattan Co. building, in Wall Street, built in 1929, rises 927 ft. or 70 stories. All three of these buildings top the Woolworth Building, which for many years had the distinction of being the tallest in the world, being 792 ft. or 60 stories high. The Metropolitan Life Building, erected in 1908, is 700 ft. or 50 stories, and the Singer Building, completed in 1907, is 612 ft. or 41 stories.

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Orders for 689 steel boilers of 825,203 sq. ft. were placed in April, against 630 of 664,784 sq. ft. in March, according to reports received by the Bureau of Census from 73 manufacturers. Orders in the first four months of 1931 totaled 2433 boilers of 2,689,053 sq. ft., compared with 3809 boilers of 4,354,457 sq. ft. in the corresponding period of last year.

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Members of the Electric Hoist Manufacturers Association report that the number of hoists ordered during April increased 4.5 per cent, as compared with the previous month, and the value of such orders increased 4.9 per cent, compared with March. Shipments were 25.8 per cent smaller in April than in March.

INSTITUTE LEADERS PLEAD FOR FORBEARANCE IN COMPETITION

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IN one of the most stirring meetings in its history, the American Iron and Steel Institute, convening at Hotel Commodore in New York, May 22, took stock of the demoralized state of the iron and steel business, frankly facing—and naming—the evils besetting the industry and threatening its very integrity.

Nothing contributed more to clearing the atmosphere and to focusing attention on the extreme seriousness of present problems than an extemporaneous address by James A. Farrell, president, United States Steel Corpn., at the morning session. In no uncertain terms he placed the blame for ruthless price slashes on the steel executives themselves and indicated that, in the absence of a radical change of policy, steel companies would fail to earn preferred dividends, with even worse possibilities only a short step beyond.

He stated that there is no logical reason for selling products cheap just because production is declining, declaring that a 50 per cent operation should yield a fair profit. He denounced wage cuts as an ineffective way of bringing about better earnings and asserted that the key to improvement lies in determined resistance to the pressure of unfair buyers.

Neither Mr. Farrell nor any of the other speakers recommended a modification of the anti-trust laws as a way out. There is apparently widespread doubt as to the desirability of seeking governmental sanction for trade agreements, since the almost certain sequel would be measures that would shackle the industry with severe regulatory restrictions. Moreover, past experience indicates that pools and other "iron clad" agreements are only as good as the word of the participants, and that the advantages of power to enforce fair competition are largely illusory.

In conformance with this view, Eugene P. Thomas, vice-president, United States Steel Corpn., stated that the industry does not seek governmental assistance, but will rely on voluntary cooperation and mutual tolerance. In a similar vein Charles M. Schwab, president of the institute, declared that the need of the times was "not an agreement with reference to prices and things that might be considered as contrary to the laws of the country, but an understanding with each other.

WILLIAM J. FILBERT
Recipient of Gary Medal

"I was reading a book last night of 'Wellington's Campaign in Spain'," President Schwab said. "When the Duke came to one of the fine old bridges of Spain that they were about to tear down to prevent his crossing the river, he hated to see that destruction, and he said to his opponents, 'Do not blow up that bridge to prevent my crossing this stream, and I will give you my word of honor as an Englishman that we will not use it.' And the bridge was not torn down and the Duke of Wellington did not use it, and that gave rise to the current expression so long used, 'As good as the word of an Englishman.' Now why can't we adopt the slogan and say, 'As good as the word of a steel official.'"

The feature of the banquet was the presentation of the Gary Memorial Medal to William J. Filbert, controller and director, United States Steel Corpn., for outstanding achievement in accounting and finance in all branches of the iron and steel industry. In awarding the medal, President Schwab praised Mr. Filbert's wide technical knowledge, stating that no other man had done so much to put accounting on a sound basis in the industry.

In his response Mr. Filbert observed that there is little profit in having the best plants and the finest equipment if the owners fail to learn in dollars and cents what their operations mean. He said that the advent of larger business organizations in the last 30 years had greatly increased the importance of the fiduciary and accounting branches of management, adding that, without the essential and correct knowledge that they supplied, all would be chaos.

Mr. Filbert was the first secretary of the American Iron and Steel Institute. He started business life in 1881 with the Chicago & North Western Railroad. First employed in the purchasing department, he later entered the general accounting department, where he became chief accountant. In 1898 he became assistant auditor of the Federal Steel Co., subsequently becoming auditor. In June, 1902, he was made controller of the United States Steel Corpn. In 1920 he was elected a director of that company, and in 1922 was made a member of the finance committee.

Other speakers at the banquet were E. P. Thomas, whose address is printed elsewhere; Robert Gregg, president, Atlantic Steel Co., Atlanta, Ga.; the Rev. Dr. W. Warren S. Giles, First Reformed Church, East Orange, N. J., and Dr. Thomas Darlington, former health commissioner of New York. The banquet attendance was 1250. In opening the postprandial program President Schwab told a story at the expense of Mr. Farrell which was particularly appropriate to the times. He said that Mr. Farrell's grandson asked him, "How many mills make a cent?" Mr. Farrell's answer was, "Not a darned one."

At the directors' meeting in the afternoon resolutions of tribute to E. A. S. Clarke, late secretary of the institute, were adopted. Samuel Mather, Pickands, Mather & Co., Cleveland, retired as a director and was made an honorary vice-president. H. G. Dalton, Pickands, Mather & Co., was elected director to fill the vacancy. It was announced that the Iron and Steel Institute (of Great

Britain) will hold its convention in this country next year, for the first time since 1911.

Two distinguished foreign visitors were introduced by Mr. Farrell at the morning meeting. They were Giovanni Secagno, commissario ministeriale della Federazione Nazionale Fascista Commercio Metallurgico e Derivate, Automotocicli e Accessori, Rome, Italy; and Cav. di Gr. Croce Giorgio E. Falck, cavaliere al merito del lavoro, Associazione fra gli Industriali Metallurgici Italiani, Milan, Italy. The latter is an honorary member of the American Iron and Steel Institute.

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Ohio Foundrymen Hold Spring Meeting

About 50 Ohio foundrymen, mostly from Cleveland and vicinity, attended the spring sectional conference of the Ohio Foundries Association, held at the Cleveland Athletic Club, Cleveland, May 22. Following a luncheon, an interesting program was carried out.

A paper on alloys and their effects on iron and steel, with particular regard for those used as scavenging agents, which was prepared by R. C. Good, metallurgical engineer, Electro Metallurgical Sales Corpn., New York, was read in Mr. Good's absence by D. B. Reeder, Pittsburgh metallurgist of that corporation.

A talk on "What Would Influence a Better Price Level?" was given by E. L. Shaner, editor of *Steel*. In his opinion a better level of prices may be brought about by the return of confidence, which would not come until all inflation had been squeezed out of prices. As steps toward remedying present conditions the speaker said that manufacturers should write down inventories, cut costs, get to work and take today's prices as they are and try to make a profit.

Arthur J. Tuscany, manager, Gray Iron Institute, spoke briefly, declaring that the need of cooperative effort among foundrymen is more important than ever before. A. H. Kramer, Advance Foundry Co., Dayton, president of the association, referred to the new Ohio safety code for foundries, which became effective May 1, calling attention to the fact that severe penalties are provided for about every violation of the code.

Cleveland foundrymen in attendance decided to organize a group with a view of holding frequent meetings to discuss foundry problems. Cleveland has been without a local foundry organization for four or five years and the need of closer contacts through group meetings was emphasized. L. P. Robinson, Werner G. Smith Co., Cleveland, was named as chairman of a committee to arrange for the formation of a Cleveland group.

To Hold a Symposium on Malleable Iron Castings

A symposium on malleable iron castings will be one of the features of the annual meeting of the American Society for Testing Materials at the Stevens Hotel, Chicago, June 22-26. The session is scheduled for Friday, June 26, at 2 p. m., and is to be a joint one with the American Foundrymen's Association. This symposium will give to engineers authoritative, critical data on the properties of malleable iron castings produced by present methods of production. It will be supplemented by discussions of properties which at present may not be capable of completely authoritative treatment but which have significant bearing upon engineering applications. A general outline of the symposium follows:

Introduction: This will include statements discussing relationship between strength of test bar and of castings. It will take up briefly higher strength malleable iron and cupola malleable iron.

Manufacture of Malleable Iron: A treatment of what malleable iron is from a chemical viewpoint and process of manufacture, as well as data on the effect of malleablizing process in thick sections and the distinction between malleable and gray iron.

Properties of Malleable Iron: This part will bring out available data on physical constants, mechanical properties, magnetic properties, micro-structures, machineability and heat treatment, and statements regarding properties on which no specific data are available will be given by leaders in the industry.

Properties of High Strength Malleable Iron and of Cupola Malleable Iron will be discussed and data given. Necessity for Cooperation between Engineer, Designer and Foundry will be given by a leading metallurgist.

Uses of Malleable Iron: These will include an extensive classification of industries using malleable iron.

In addition to these topics, which will be dealt with by various metallurgists in the malleable industry, there will be two technical papers:

"Machineability of Malleable Iron," by O. W. Boston, director, engineering shops, University of Michigan.

"Corrosion of Malleable Iron," by F. L. Wolf and L. A. Meisse, chief engineer and research metallurgist respectively, Ohio Brass Co.

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Program of Iron and Steel Engineers

Sessions of the Association of Iron and Steel Electrical Engineers' annual convention will be held on June 15 to 19, inclusive, in Cleveland. Registration and business sessions and some of the technical sessions will take place in the Hotel Statler. Technical sessions after the first day, however, will be held in the Public Auditorium. The auditorium will furnish the setting for the iron and steel exposition, also. About 50,000 sq. ft. of space will be filled with exhibits of developments, equipment and apparatus used in the iron and steel industries.

Among the topics to be discussed are the following:

"Electrical Developments in the Iron and Steel Industry," by W. H. Burr, electrical superintendent, Lukens Steel Co., Coatesville, Pa.

"Alternating-Current Arc Welding," by Grover A. Hughes and R. C. McBride, electrical engineer and chemist respectively, Truscon Steel Co., Youngstown.

"Application of Health Lamps in the Iron and Steel Industry, to Promote Health and Efficiency," by M. J. Dorcas, National Carbon Co., Cleveland, and L. C. Porter, General Electric Co., Cleveland.

Report of the special committee on bearings, presented by F. D. Egan, electrical superintendent, Bethlehem Steel Co., Lackawanna, N. Y.

"Mill Drives," a report by W. S. Hall, superintendent of engineering and construction, Illinois Steel Co., South Chicago.

"Motor and Control Equipment for Cold Strip Mill Drives," by F. Mohler, General Electric Co., Schenectady.

"Combustion Control of Open-Hearth Furnaces," by Martin J. Conway, combustion engineer, Lukens Steel Co., Coatesville, Pa.

"Practical Metallurgical Heating Applications," by Harry Dobrin, consulting fuel engineer, Pittsburgh.

Symposium: "Electrical vs. Mechanical Devices in Combustion Control of Open-Hearth Furnaces," by Joseph F. Shadgen, Smoot Engineering Corpn., New York; G. D. Conlee, Republic Flow Meters Co., Chicago; P. S. Dickey, Bailey Meter Co., Cleveland; W. H. Shallcross, Shallcross Control Systems Co., Milwaukee; R. W. Simpson, American Heat Economy Bureau, Pittsburgh.

There will be two sessions on lubrication engineering, occupying both morning and afternoon on June 18. The exposition will be open on all five days of the week, closing at 5.30 on Tuesday and Wednesday, and at 10 p. m. on the other days. It will open at 7 p. m. on Monday, at 1.30 p. m. for the next three days, and at 9.30 a. m. on Friday.

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International Foundry Meeting in Italy

An international convention and exhibition, covering foundry subjects and to be participated in by various European foundry organizations, will be held in Milan, Italy, next September. The exhibition, which will take place in the machinery hall of the Milan Sample Fair, will be open Sept. 12 to 27. European foundry associations and organizations are participating and American manufacturers of equipment and supplies have been invited to exhibit.

The technical sessions will be held during the week of Sept. 13, followed by organized visits to foundries in the vicinity of Milan and later by a tour including Turin, Genoa and Rome. European foundry associations are participating actively in the congress and the American Foundrymen's Association has been invited to contribute an exchange paper.

TO BRING BUSINESS UPTURN BY MODERNIZING INDUSTRIAL PLANTS

MODERNIZATION of industrial plants was urged at the meeting of the National Machine Tool Builders' Association as the way to better business and increased employment.

The import of increased concentration of industry into large corporations was also considered at the machine tool meeting.

Instalment selling of machine tools was actively discussed.

MODERNIZATION is believed to be one way of chief promise today to put business on the upturn and thereby get men back to work. The leading business papers of the country will probably take the initiative to arouse a nation-wide espousal of the movement. A campaign to this end will shortly be launched under the leadership of the Associated Business Papers, Inc., the organization of those divisions of the press devoted to industry, trade and profession.

The plan as developed up to the present time was explained at the spring meeting of the National Machine Tool Builders' Association, held at Old Point Comfort, Va., May 18 and 19. The exposition was made by Earl Whitehorne (McGraw-Hill Publishing Co., New York), a member of the committee of the Associated Business Papers appointed to make the survey and to plan for the wide dissemination of the findings.

A comprehensive study has been made that promises to show that mechanization serves to increase employment rather than the reverse. It will be impressive with regard to the breadth of labor demand that will accrue out of modernization. It will bear strongly on the economic justification of modernization. It is intended to appeal to all industries and is not fostered in the interest of any one or more industrial groups. To get full and favorable consideration by industry as a whole, the approval is expected at the outset of business and financial leaders of national reputation.

Pending the release of information on the details of the plan, it would appear that so convincing a presentation will be made of the warrant for modernization that large numbers will be impelled forthwith to apply it and so begin an expansion in industrial activity that will slowly but surely gather momentum. The committee of the business paper association is counted on to issue the first of its studies within a very short time.

Federation of Industrial Machinery Builders Hinted

Carl A. Johnson (president, Gisholt Machine Co., Madison, Wis.), president of the machine tool builders' association, dwelt on this and at least on one other movement now gathering headway as among developments that will allow machine tool builders to talk with rather than to builders of industrial machinery in general. Besides the plant modernization movement, he referred to the trends toward a federation of the makers of industrial machinery. He emphasized that the consummation of the federation idea would provide that the five or six billion dollars of annual business would have one voice to speak for the industry in whatever happening might call for such expression, be it in respect to corporation tax matters, or a united front in economic questions, or what not.

Mr. Johnson paid a tribute to the business papers for the attention they had been giving to the question of obsolescence, and he indicated a lively belief in the promise of the campaign of the Associated Business Papers. An outline of the plan was given in the preceding issue by telegraph from the Old Point Comfort meeting.

The campaign will revolve around an analysis of the great economies of plant modernization with all that this will do for cost reductions and increased employment. "We must," said Mr. Johnson, "get men to work before winter."

Portent of Large Corporations

The increasing concentration of industry into large corporations was discussed at some length in his report by Ernest F. DuBrul, general manager of the association. His contention is that the 200 very large corporations in the country, with gross assets of over $80,000,000 each, occupy an increasingly dominant position. For his facts, he referred to a study of the industrial situation made by Gardiner C. Means, of Columbia University, and reported in the *American Economic Review* for March, 1931. This study shows that there are few major industries which cannot boast of at least one corporation with assets over one hundred million dollars. Six or more industries can boast of one or more billion-dollar corporations.

Out of 303,000 non-financial corporations in 1927, 200 of these controlled over 45 per cent, perhaps over 50 per cent, of the assets of such non-financial corporations, and received over 40 per cent of all the income of such corporations. Between 1909 and 1927, the assets of the 200 corporations increased more than twice as fast as the assets of the others. In fact, during the years from about 1924 to date, their assets have grown three times as fast as the assets of the smaller corporations. These large corporations reinvested a larger proportion of their earnings, they secured a larger proportion of new capital which was saved by the public, and they increased their size as well through mergers and absorptions of smaller corporations.

Mr. Means points out that if the recent rates of growth of these corporations continue, 80 per cent of the non-financial corporate wealth will be in the hands of 200 corporations by 1950; only 20 years from now.

"Besides the part of industry which is dominated by these huge units through ownership," said Mr. DuBrul, "some more of industry is dominated by them through influence. Smaller companies which sell to or buy from the larger companies are to be influenced by them to a great extent. In many cases the continued prosperity of the smaller company depends upon the favor of the larger, and almost inevitably the interest of the smaller company is bound up with the interest of the larger.

"As there is no present reason to think that this condition will not continue I submit that we must think in terms of these 200 large corporations rather than in terms of 303,000

smaller ones, simply because the operation of these 200 corporations is much more typical of industry than the operation of the small corporations.

"Less than 2000 men are directors of these 200 largest corporations. An important number of these are inactive, so that right now the ultimate control of over one-half of American industry is actually in the hands of a few hundred men. So much economic power in the hands of the few men who control these giant corporations is a tremendous force which can harm or benefit a multitude of individuals. It can affect whole industries and whole districts. It can shift the currents of trade, and bring ruin to one community and prosperity to another. Executives of these corporations recognize their responsibilities in growing numbers.

"The large business organizations which these few men control have now passed far beyond the realm of private enterprise. They have become institutions charged with a public interest. The future of every small corporation in any line of business must be seriously affected for good or ill by the policies of the managements of these large corporations which dominate our economic life.

"Their labor policies, their price policies, their purchasing policies, are of the utmost importance to every American. If the direction of these few large corporations is not wise, not careful, not sane, not considerate, not judicious, it will not be surprising to find demagogs clamoring for many palliatives which they hope will be cure-alls."

Offers a Sales Research Problem

Of the 200 large corporations, 100 are industrials, the others being railroads and utilities. Of the industrials, about 30 are engaged in metal production and fabrication. So Mr. DuBrul made the point that if the facts were known as to whether or not the highly irregular nature of the machine tool business is mainly owing to irregular purchasing by the large corporations, steps might be taken to show the executives of these large companies that their very size imposes an obligation on them to do a good job of long-term planning. This, Mr. DuBrul emphasized, calls for research that is as important as any that could be done by the association at this time.

At the preceding meeting of the association, a sales research program had been authorized, and in his remarks opening the Old Point Comfort meeting, President Johnson told how the work proposed in sales research had been extended beyond the original plans. Little of the $20,000 appropriated at the time has as yet been expended, but Mr. Johnson said that a new staff member had been substantially engaged to direct the work of research.

Conditions of business with the machine tool builders were briefed by General Manager DuBrul, based on the showing of the association's index of orders and the compilation by the Robert Morris Associates of a composite financial statement.

For the year 1929 orders averaged 281 per month on the scale of the index. The figure 260 represents capacity of one-shift operation. Some of the excess of orders in 1929 was carried over into 1930 as unfilled orders.

The maximum monthly shipments during 1929 amounted to 329 on the scale, which represented very much overtime, carried on at extra cost to the industry.

In 1930 the orders for the year averaged only 127.8, or 45.5 per cent of the 1929 figure. Shipments in 1930 ran 53 per cent of the 1929 shipments, showing a considerable backlog of orders carried over into the early part of 1930.

The index of orders reached a low point of 60 in November. There was some rise until March, but April reports showed a recession "which can be expected to continue until the summer."

The Morris Associates composite of the statements of 59 companies showed profits on sales of only 1.9 per cent for 1930, while for 35 companies they amounted to 13 per cent in 1929. Only 50 per cent of the companies in 1930 made a profit and this averaged 0.1 per cent.

Instalment Selling

Among a number of subjects discussed at the second general session of the convention, that of financing the sales of equipment was of major interest and importance. Where credit terms beyond the customary 30 days are required, owing to the existing conditions, a lack of uniformity has been noted in the method of handling the finance charges. As a result, in some cases the purchasers of equipment have found it easier to avail themselves of credit through the suppliers than to depend upon their own local financial connections and credit.

The necessity of an adequate financing charge, above the customary interest rate and commensurate with that applied by financing companies under similar circumstances, was emphasized. It was pointed out that the manufacturer who handles the long term paper of his customers under these conditions is placing himself in competition with the commercial banker and the finance company, with the disadvantage that he neither preserves the liquidity of loans, as does the former, nor receives the additional compensation of the latter. Upon resolution, the appointment of a committee was voted to cooperate with a similar committee of machine tool dealers to study this situation.

Depreciation rates on machine tools, as given in the recently issued report of the Internal Revenue Department, were also discussed at this session. It was felt that these rates represented extreme cases of longevity, were quite out of line with the present day theory of obsolesence, were misleading to manufacturers in establishing depreciation reserves and were inadequate for tax deduction appraisals.

One of the items of Mr. DuBrul's report suggested that it is time to establish a class of associate members, to take in builders of metal working machinery that does not exactly meet the association's definition. "They are closely allied to us," said he. "There is no other place for them to go for association service, and we can easily take care of them."

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New 152-lb. Rail Laid by Pennsylvania

The first stretch of the heaviest steel rails ever laid in the main line track of any railroad in the world has been placed in service on the Pennsylvania Railroad near Tyrone, Pa.

The rail is the first of an experimental order recently announced by the Pennsylvania Railroad to meet the requirements of sustaining 100,000-lb. axle loads at speeds of 100 miles per hr. Present maximum needs require rail which will sustain axle loads of 80,000 lb. at a speed up to 80 miles per hr.

The new rail, which weighs 152 lb. to the yard, as compared with the Pennsylvania's present heavy rail of 130 lb., was rolled by the Bethlehem Steel Co. at its Steelton plant. It will be placed in service at two different locations on the Pennsylvania's main line between Pittsburgh and Harrisburg, Pa., and also on the heavily traveled lines between New York and Philadelphia.

Following investigation and research over a period of two years by committees of the Pennsylvania Railroad's engineering department, the new rail was finally designed with approximately 75 per cent greater stiffness or strength than the present standard rail. The new rail is 8 in. in height. It presents a number of new features in design, being 1⅝ in. higher than the present 130-lb. rail.

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Fifteen railroad locomotives were shipped in April, compared with 10 in March, according to reports received by the Bureau of the Census. Of the April shipments, 13 of the locomotives were of the steam type, 12 for domestic and one for foreign account. The two electric locomotives shipped were for domestic use.

IDLE MONEY, IDLE MEN

THE big problem of today is to put our idle men to work. *Soon.*

Who is going to do it?

The socialists would like to see the Government take charge of the job. But the Government is having its hands full tending to its own business.

Employers would gladly put men to work but ask the pertinent question: "What are we going to use for money to pay them?"

Banks are crammed with idle money looking for work. Idle money—idle men.

Putting this idle money to work will put the idle men to work, too.

But we cannot conscript money. Nor will bankers lend it on "blue sky." It must be secured by tangible assets.

No assets are more "tangible" than wealth-producing machinery. And no investment is better secured than by increased dividends due to cost reduction.

The Government estimates that we have twenty billions invested in the United States in the productive equipment of our manufacturing industries.

We have good reason to believe that half of this at least is obsolete, in the sense that it would be profitable to replace it with modern machinery.

Ten billion dollars put to work over a three-year period of industrial modernization would bring prosperity and guarantee it for years to come.

It would solve the immediate problem of idle money and idle men.

It would put American industry on an efficiency plane which would enable us to compete on a price basis in any market.

It would make possible the price reductions necessary to increase consumer purchasing power without jeopardizing wage rates or profits.

It would stimulate all lines of business and industrial activity through the percolation of these funds through all strata of human enterprise.

It would provide our railroads with the increased revenue they are seeking without the doubtful, non-productive expedient of increasing freight rates.

It would enable us to solve successfully our present economic problem of unemployment without danger of recourse to paternalism or communism.

Finance, management and labor can unite in this movement with a common aim, secure in the knowledge that in pursuing this course they are following the same path that has always led them to increased prosperity.

By
JOHN H. VAN DEVENTER
Industrial Consultant
The Iron Age

Copies of this insert may be secured from the Reader Service Department of THE IRON AGE, 239 West 39th Street, New York.

Previous recent editorials in this series appeared in the following issues of THE IRON AGE: March 12, March 19, April 9, April 16, April 23, April 30, May 7, May 14, May 21, 1931

Cast Iron Pipe Freight Rates from South Cannot Be Reduced

Interstate Commerce Commission Refuses to Permit Lower Tariffs to Eastern Seaboard

WASHINGTON, May 26.—The Interstate Commerce Commission in a report made public last Friday refused to permit Southern railroads to put into effect proposed reduced rates on cast iron pipe and fittings from the Birmingham district and Chattanooga, Tenn., to South Atlantic and Gulf ports for coastwise movement to North Atlantic ports. The commission ordered cancellation of the schedules, which would make cuts as high as 50 per cent.

In a separate concurring report, Commissioner Lewis said his concurrence was based on the record in the case, but beyond that, he stated, is the fact that at this time carriers are asserting that increases in rates all over the country are necessary.

Calls Reduction "Incongruous"

"In the face of such declaration, the proposal of the carriers to cut their rates 50 per cent, and particularly when the present rates prevail in lower rated territory, seems incongruous."

Mr. Lewis pointed out that the proposed rate from Birmingham to Norfolk, Va., $5.50 a net ton, is approximately 64 per cent of the present rate, $8.60, and to Pensacola, Fla., the proposed rate, $2.45, is 50 per cent of the present rate, $4.90. He explains that the present rates are those prescribed by the commission for application in Official Classification territory for like distances. He said that the evidence does not show and that he is unwilling to assume that rates made on the proposed basis are not lower than minimum reasonable rates and would not cast a burden on other traffic. He agreed with conclusions of the majority that the lower rates would disrupt the rate structure on cast iron pipe and impair revenues of the carriers.

In a dissenting report, Commissioner Farrell said that facts in the majority report did not indicate that any provision of the Interstate Commerce act would be violated if the suspended rates were made effective.

Protests against the proposed rate reductions were made by the Somerville Iron Works and Hedges, Walsh & Widener Co., Chattanooga; Somerville Iron Works, Somerville, N. J.; Krupp Foundry Co., Lansdale and Quakertown, Pa.; Salem Brass & Iron Mfg. Co., Bridgeton, N. J.; National Foundry Co., Brooklyn, and H. Wilson and Alfred S. Knowlton on behalf of carriers in Trunk Line and New England territories.

Testimony was given by witnesses for Birmingham producers that their sales have been greatly curtailed on the Eastern Seaboard, especially in New England, either by the change in the rate adjustment or the general business depression. One of the protestants, who has been actively engaged in the manufacture and sale of cast iron pipe in Trunk Line territory for 62 years, estimated that about 400,000 tons of cast iron pipe is consumed on the seaboard, Philadelphia and north, per year, and that Birmingham supplies more than 100,000 tons of this quantity.

Present Rates Not Unfavorable

"The evidence is not convincing that Southern manufacturers are unable to ship cast iron pipe all-rail to the Eastern Seaboard," the majority report said. "The present rates from their factories are not higher than maximum reasonable rates and are very favorably related to those from competing factories in Official territory. The rates from the two territories are on the same level mile for mile. The rates from the Southern origins are higher only because of the longer distances. Neither are we persuaded that the prosperity of the Southern pipe manufacturers is dependent on the establishment of the proposed rates. They now have a wide outlet for their products in Southern, Western and Central territories. In the latter the most important consuming territory in the country, they have a very material advantage over Eastern factories, their only competitors. The factories in Central territory are owned by two of the large Birmingham manufacturers. This, together with a lower cost of production at Birmingham, enables them greatly to influence the market in Central territory, as is evidenced by the fact that they obtain materially higher prices in that territory than in Eastern territory."

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Circuitous Railways May Meet Direct Route Rates

WASHINGTON, May 26.—Iron and steel products moving in Official Classification territory and cast iron pipe and fittings transported in Southern territory will be allowed to be carried over the longer hauls, with two limitations, at the same rates charged for shorter hauls if the Interstate Commerce Commission approves recommendations made in a report proposed by Examiner C. K. Glover. The report, made public last Thursday, covers 130 applications made by railroads, iron and steel manufacturers and others, and relates to departures from the so-called long-and-short haul provisions of the Interstate Commerce act.

The proposed report recommends that the commission permit circuitous rail lines to meet the charges of more direct lines to and from competitive points. One limitation provides that rates at intermediate points shall not be higher than the lowest combination. The other provides that authority to maintain rates at intermediate points shall not apply to circuitous routes where rates between the more distant points are less than 75 per cent of the rates resulting from application of the same scale to distances over circuitous routes. The basic rates were prescribed in the general (Hoch-Smith) iron and steel case.

Grouping arrangements employed in connection with the rates on iron and steel established from the Pittsburgh district and from and to the Chicago district were not in complete conformity with the commission decision in the general rate case. The importance of continuing these groups was urged in applications to the commission. In order to do this it was found necessary for the carriers to depart from the so-called long-and-short haul provisions. There are 108 shipping points in the Pittsburgh and 68 in the Chicago group. The only instance where industrial grouping is employed in connection with the rates on cast iron pipe and fittings with respect to the relief sought is in the case

of origin points in Alabama. The examiner said that, in view of the evidence presented both by carriers and shippers as to the desirability of maintaining intact the groups and the absence of any evidence in opposition, no basis appears for condemning them. It was added that the determination of their limits should be left to a more appropriate proceeding, should it develop that the present arrangements result in violation of any provision of the act.

The applicants contended that prescription of the usual "circuity" limitations would result in the wholesale closing of routes with a detrimental effect on the service and on the free movement of iron and steel and cast iron pipe. Also, it was urged, it would deprive shippers on such routes of the benefits and advantages of fabrication-in-transit arrangements under which their business has been developed.

The usual "circuity" limitation is 50 per cent. The application of this limitation would have particularly affected the important Pittsburgh & Lake Erie line serving the Pittsburgh district. Steel makers and others in the Pittsburgh district pointed out that in a single year that carrier transported 165,412 cars of iron and steel subject to fifth class rating. This was 18 per cent of the carrier's total traffic. The applicants said that the closing of routes from the Pittsburgh district to many important destinations in the East would be inevitable, should the relief sought be denied. Testimony on behalf of the United States Steel Corpn. was to the effect that, although Pittsburgh is the largest producing district in the world, it has but six railroads to handle its traffic and that, with all existing routes open, congestion and delay occur. A witness for the Jones & Laughlin Steel Corpn. pointed out that the service of the routes of the Pittsburgh & Lake Erie, New York Central and Erie railroads is surpassed by no route serving the Pittsburgh district, and that to deny relief would take away 50 per cent of the available transportation existing at present in certain directions.

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Output of Ferroalloys Fell Off in 1930

The shipments of ferroalloys of all classes in 1930 amounted to 650,240 gross tons, valued at $51,900,220, a decrease of 22 per cent in quantity and of 31 per cent in total value. The production of ferroalloys in 1930 was 732,518 tons, compared with 869,563 tons in 1929, a decrease of 16 per cent.

The production of ferromanganese in 1930 was 274,830 gross tons, containing about 216,000 tons of manganese (metal), an average of 78.59 per cent of manganese. In the production of ferromanganese in 1930 there were used 459,478 gross tons of foreign manganese ore, 40,501 tons of foreign ferruginous ore, 32,969 tons of domestic manganese ore, 10,538 tons of iron ore, and 9712 tons of cinder, scale and scrap.

Of the foreign manganese ore used in 1930, Russia supplied 211,436 tons; Brazil, 138,757 tons; India, 44,667 tons; Africa, 62,913 tons, and Chile, 1705 tons. The quantity of domestic manganese ore used in the manufacture of ferromanganese in 1930 represented 6.7 per cent of the total manganese ore used, as compared with 4.3 per cent in 1929.

The production of ferrotungsten in 1930 was 907 gross tons, containing 1,592,294 lb. of tungsten (metal), an average of 78.39 per cent of tungsten. The shipments of ferrotungsten in 1930, amounting to 736 tons, contained 1,282,620 lb. of tungsten, and the average value per lb. of contained tungsten was $1.25 f.o.b. furnaces, compared with $1.10 in 1929.

The production of ferrovanadium in 1930 was 1257 gross tons, containing 1,079,849 lb. of vanadium (metal), an average of 38.35 per cent of vanadium. The shipments of ferrovanadium in 1930, amounting to 831 tons, contained 713,480 lb. of vanadium, and the average value per lb. of contained vanadium was $3.15 f.o.b. furnaces, compared with $3.12 in 1929.

Ferroalloys Shipped from Furnaces in the United States, 1929 and 1930

Variety of Alloy	1929 Gross Tons	1929 Value	1930 Gross Tons	1930 Value
Ferromanganese	334,162	$33,184,912	273,640	$25,865,783
Spiegeleisen	123,146	3,336,703	94,918	2,469,861
Ferrosilicon (7 per cent or more silicon)	310,280	15,730,950	234,328	10,430,720
Ferrotungsten	3,049	5,828,760	736	1,603,903
Ferrovanadium	1,767	4,665,720	831	2,244,304
Other varieties*	56,920	12,759,933	45,787	9,285,649
	829,324	75,506,078	650,240	51,900,220

*Ferrochromium, ferromolybdenum and calcium-molybdenum compounds, ferrophosphorus, ferrotitanium, ferrozirconium, silicomanganese and silicospiegeleisen, and zirconium-ferrosilicon.

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Steel Castings Business Slackened in April

The Steel Founders' Society of America, which compiles monthly figures on operations in the steel castings industry, reports that three foundries operated at 100 per cent of capacity in April, but in the remainder of the industry the tendency of operations was downward, there having been a 4½ per cent increase in the number of foundries reporting operation below 50 per cent.

Five per cent of the reporting members reported the outlook for future business as good, while 56 per cent gaged the outlook as only fair. The remainder see poor business prospects. "The general picture," says the society, "reveals a slackening of business with raw material markets weak and the business outlook indicating the usual summer recession."

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Production Conference to Discuss Overhead Control

Design, equipment and other factors affecting overhead will be discussed at the production conference to be held by the American Management Association at the Chamber of Commerce, Rochester, N. Y., June 1 and 2, with the cooperation of the management division of the American Society of Mechanical Engineers, the industrial management council of the Rochester Chamber of Commerce, and the Rochester chapter of the National Association of Cost Accountants.

"The Effect of Design on Overhead," by O. D. Reich, president, Dexter Folder Co., and "Engineering and Shop Standardization," by T. R. Jones, vice-president and general manager, Harris-Seybold-Potter Co., are papers scheduled for the opening session, with W. F. Coleman, vice-president, W. A. Jones Foundry & Machine Co., presiding.

The afternoon session, June 1, with E. S. LaRose, Bausch & Lomb Optical Co., presiding, will include papers by W. J. Austin, president, Austin Co., on "The Relation of Building and Equipment Design and Layout to Overhead Reduction," and "The Relation of Machine and Equipment Layout to Overhead Costs," by E. C. Brandt, assistant works manager, Westinghouse Electric & Mfg. Co.

At the dinner meeting, with James Gleason, president, Gleason Works, presiding, L. R. Boulware, sales manager, Syracuse Washing Machine Corpn., will speak on "A Marketing Manager Looks at Manufacturing Overhead."

Sessions on Tuesday, June 2, will feature the following addresses: "Reduction of Fixed Charges by the Use of Three Shifts," by J. G. Marshall, general superintendent, Union Carbide Co.; "Organization for the Elimination of Indirect Labor and Clerical Effort," by T. Clark, works manager, Kendall Co.; "Costs of Indirect Expense During Seasonal and Cyclical Fluctuations of Business," by C. S. Carney, vice-president, Trundle Engineering Co.; and "Methods to Bring Under Control the Ever-Increasing Ratios of Indirect to Direct Effort," by R. S. Perry, assistant to the president, Ingersoll Milling Machine Co.

To Roll New Electric Sheets of High Permeability

Contain Nickel, Called Hipernik, and Produced on Armco Continuous Mills

THE United States Patent Office will issue patents this week to the Westinghouse Electric & Mfg. Co., Pittsburgh, for Hipernik, a new metal possessing unusual magnetic properties. The name is made up of the first syllable of the two words high permeability, the valuable property the metal possesses, and three letters from the word nickel, which is one of its important elements.

Hipernik is said to be the most magnetic metal ever discovered, being over 30 times as magnetic as ordinary open-hearth steel or iron, which have a maximum magnetic permeability under 5000, as the scientists express it.

Many of the uses to which the new metal may be applied are still under the observation of research engineers. Its use has greatly improved radio receivers and sound amplifying systems. Instrument transformers also have been made smaller, it is stated, and are more efficient and accurate when the transformer core is made of Hipernik.

For some years experimental work has been carried on by Dr. T. D. Yensen, manager of the magnetic division of the Westinghouse Research Laboratories. But the experimental production was on a small scale and costly, so arrangements were made to produce it on a commercial basis at the American Rolling Mill Co., Middletown, Ohio.

Hipernik is now being rolled from 12,000-lb. ingots into coils many feet in length on Armco's continuous sheet mills. The finished product is used either in sheet form or as cold-rolled strip 0.014 in. in thickness.

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"Production Cost Should Protect Employees"

In a radio broadcast Sunday evening, Gerard Swope, president, General Electric Co., said that each industry should provide in the cost of its products the price of assuring regular employment to its labor. He said in part:

"It is to be expected that each trade and industry should carry its burden of cost of production of the various articles that society needs, including the element of cost that varying attendant industrial hazards to life or health contribute, and in turn shall therefor be defrayed by the users of such articles. If seasonal variation in employment is inherent in the character of production, this factor should also be included in the cost and be borne by the users of such articles.

"Each industry then will defray the total cost of such articles, including provision for the use of instrumentalities of production, whether they shall be buildings, machinery, material or the regular and adequate compensation for labor, and that society shall not later be called upon to bear a vicarious portion of this cost through taxation or charity. The distribution of the sums raised by taxation or charity can never be effectively done and is at best a makeshift, a method as bad for the community as it is often harmful and not desired by the recipient.

"It is confidently believed that if the fear of lack of work were removed from the mind of the working man, he would approach his work with an entirely different attitude. As a result, the quality of workmanship would be better; he would feel free to suggest better methods, which would lower costs and be reflected eventually in lower selling prices to the public and assure a wider sphere of use for the article itself.

"Industry, possibly, has been slow to recognize its responsibilities in this direction, but now it is beginning to do so. The first problem, of course, is to avoid seasonal and occasional variations of employment; in other words, to introduce regularization of employment; second, in those industries where these measures are seemingly impossible, at all events today, to ameliorate the hardships of unemployment when they arise."

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Freight Rate Decisions

WASHINGTON, May 26.—By a decision of six to five, the Interstate Commerce Commission today granted permission to railroads to reduce the rate on iron and steel bars from Terre Haute, Ind., to the Chicago switching district from the present rate of 20½c. per 100 lb., minimum 40,000 lb., to 15c., minimum 80,000 lb. The new rate becomes effective June 1. The only shipper directly concerned is the Highland Iron & Steel Co., Terre Haute. The decision has the effect of spreading the lowered rate to the Illinois section of the Chicago switching district.

Rates based on 70 per cent of the basic scale prescribed for steel in Official Classification territory were prescribed for iron and steel scrap by the Interstate Commerce Commission in a decision last week covering the movement from Borderland, Merrimac, Matewan and Thacker, W. Va., to Ashland, Ky., and from Roanoke, Va., to Ashland and to Ironton and Portsmouth, Ohio. This basis plus 20 per cent of the arbitrary on first class traffic was prescribed for iron and steel scrap from Stone, Ky., and Mitchell Branch, Red Jacket, Gary, Alpheus, Ream, Elbert, Thorpe and Filbert, W. Va., by an interstate route to Ashland. The new rates reflect reductions and will become effective Aug. 10. The findings were based on complaints made by the M. D. Friedman Co., scrap dealer, Ashland, Ky.

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Fabricated Steel Orders Rise 58 Per Cent in April

WASHINGTON, May 26.—Making a sharp rise of 92,209 net tons, or almost 58 per cent, bookings of fabricated structural steel reported to the Department of Commerce amounted to 253,063 tons, compared with 160,854 tons in March. The April bookings were reported by 201 establishments. March orders were reported by 216 establishments. Shipments in April reported by 195 fabricators totaled 102,307 tons, against 106,272 tons in March.

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Chicago-Milwaukee Rate Reduction Approved

The Interstate Commerce Commission has approved lower freight rates on plates, bars, structural material and a few other heavy finished commodities that are shipped from the Chicago district to Milwaukee and intermediate points, such as Racine and Kenosha, Wis. About a year ago the rate from Chicago to Milwaukee was advanced from 9c. to 14.50c. per 100 lb. The new rate, which becomes effective at once, is 8.50c., as published last month by the Chicago & North Western and the Milwaukee Road.

The new rate applies only to certain products in minimum loads of 80,000 lb. The 14.50c. rate still holds on 40,000-lb. shipments, covering all steel products.

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Malleable Castings Orders Gain in April

WASHINGTON, May 26.—Orders for malleable castings in April totaled 36,384 net tons, against 34,331 tons in March, while production was 36,356 tons, or 36.6 per cent of capacity, compared with 35,210 tons, or 35.9 per cent of capacity, according to reports received by the Bureau of the Census.

May Expected to Be Peak Month for Automobile Output This Year

DETROIT, May 25.

THERE are increasing signs that May is to be the peak month of the year in automobile production. June will bring a recession, but not an alarming one. Although some companies have already cut their schedules, these decreases are more than offset by acceleration of activities by others. It is almost certain, therefore, that total assemblies this month will be 370,000 to 375,000 cars, with June staying well over the 300,000 line.

In view of the business depression, there is a surprising number of favorable comparisons to be made with last year. Domestic sales of Chevrolet cars in May will equal or exceed those of April and a seasonal decline is not looked for until the latter part of June, when there will be a leveling off to a volume somewhat higher than in the summer months of 1930. H. J. Klinger, vice-president and general sales manager of Chevrolet, declares that there is every prospect that the company will attain its objective of manufacturing 1,000,000 cars this year.

With May estimated conservatively at 110,000 units and June at 100,000, Chevrolet will have produced about 540,000 cars in the first half. This means that in the last six months it must turn out an average of better than 75,000 cars a month in order to reach its goal. If the present demand for Chevrolets can be taken as a criterion, it is not unreasonable to expect that the company will either attain its 1931 mark or miss it by only a narrow margin. At present all manufacturing divisions are working a full six days a week and assembly plants five and a half days. The company is employing 36,000 workers an average of 50 hr. a week.

Auburn is far ahead of its 1930 performance and will make more than 6000 cars this month. Buick, Cadillac and Studebaker likewise are bettering last year's record for the corresponding period. The accessory field also is not devoid of new high marks. The Budd Wheel Co. shipped 357,701 wheels in April, exceeding by 60,000 wheels April, 1929, the best previous month in its history. In the first four months this year it shipped 1,082,438 wheels against 1,961,945 in all of 1930.

Auburn, Buick, Cadillac, Studebaker and Oakland-Pontiac are bettering last year's record for the corresponding period.

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By the end of June Chevrolet will have produced well over half a million cars this year. It is now operating all manufacturing divisions a full six days a week, assembly plants five and a half days, employing 36,000 workers an average of 50 hr. a week.

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Ford's output this month may touch 125,000 cars; Chevrolet's at least 110,000. These two leaders are expected to make 90,000 to 100,000 cars each in June.

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Ford has announced standard sedan with longer, wider body and slanting windshield. Reo is presenting a low-priced Flying Cloud six and eight patterned after its Royale. Peerless is a convert to free wheeling.

Orders for June Steel Placed

IT is understood that the largest automobile maker has placed orders for its June sheet steel tonnage and will release its next month's strip requirements this week. As in April, its current purchases are relatively light, but despite this unfavorable trend, June production is likely to be 90,000 to 100,000 cars. Chrysler also has been specifying in smaller quantities than in recent months, but this is attributed to the fact that it has built up steel stocks slightly larger than normal. It does not indicate that there will be any material decrease in Chrysler operations in the next 30 days.

Despite the shrinkage in tonnage from these two important buyers, steel companies report that bookings from the automobile industry have been well sustained during May. In some cases the volume of specifications has been paralleling that of April, in other instances it has declined slightly. One large producer of light-rolled steel, which leans heavily on the automotive trade for business, declares that its May orders are about 5 per cent under those of April, with no change anticipated during the remainder of the month.

Two important automobile companies have put out inquiries for third quarter steel. Prices developed by these transactions will probably foreshadow what the steel industry can accomplish in bringing about a much-needed stabilization of the market. It is considered likely that these two consumers as well as others in the automobile industry will try to secure coverage through the balance of the year at current quotations. One automobile manufacturer is said to be

negotiating with suppliers of castings for last half requirements with the expectation that it will reaffirm prices named in first half contracts or possibly get lower quotations. In some cases this company is alleged to have awarded castings contracts for the first six months of 1931 to certain foundries with the provision that it could extend the same quotations, if it so desired, over the remainder of the year.

Ford Announces New Sedan

THE Ford Motor Co. announced its model A standard sedan the past week with a longer and wider body and slanting windshield. This body design conforms to the lines of the de luxe models recently introduced. These cars are now coming off the assembly line with steel rear quarters and roof side panels instead of the fabric quarters and panels heretofore used. At an extra cost of $15 to $20 Ford is offering safety glass in all windows of its present models. A safety glass windshield has long been standard equipment. This concentrates attention on the fact that it is not expected to be long until safety glass is available, either as standard equipment or at a small extra cost, on all cars. Its effect of reducing injuries sustained in accidents is generally recognized. The demand for it is indicated by the greatly augmented production of factories making it.

Announcement of the standard sedan would seem to belie stories that Ford intends to make radical changes in or abandon model A. Ford's strategy apparently is to improve Model A whenever advisable and there is every reason to believe that this policy will be continued. It is significant that for the first time this year returns from 33 States for May show Ford leading Chevrolet in passenger car registrations.

Reo has put on the market a Flying Cloud six at $1,295, f.o.b. Lansing, and an eight at $100 higher. Except for the difference in engines, both cars have the same mechanical specifications and the same bodies. The sharp Vee radiators and the sweeping one-piece fenders are suggestive of the Reo Royale models. The eight-cylinder power plant develops 90 hp., the six-cylinder 85 hp. The new cars have herringbone gear silent second transmission and fully-inclosed two-shoe internal hydraulic brakes. Artillery type wood wheels are standard equipment. Parking lamps on the fenders, like the headlamps and other bright outside trim, are heavily chrome plated over nickel. Initial production is being limited to sedans, but it is understood that the coupe model with rumble seat is to follow soon. At the end of this week Reo will announce its new 1½-ton truck.

Following closely on Hudson's heels, Peerless is the latest convert to free wheeling, which is embodied in a de luxe edition of its present series of master and custom eights. A Detroit automobile maker is expected to offer free wheeling shortly when it presents its cars "with refinements" instead of bringing out a completely redesigned job. Almost all companies which have not taken up the free wheeling principle are said to be conducting exhaustive investigations looking toward its adoption or toward the design of an adequate substitute. Numbered among those which have adopted free wheeling this year are Auburn, Hupmobile, Marmon, Lincoln, Pierce-Arrow, Hudson-Essex and Peerless. Studebaker was the pioneer, having introduced it last summer.

One of the larger automobile companies is said to possess the names of retail customers for whom 75 per cent of its cars are produced. In other words, it knows the owner of three out of every four cars leaving the factory. This is a fresh example of the lengths to which automobile manufacturers are going in turning out only enough units to meet retail demands.

New Strip Mill Not Contemplated

THERE is no truth in the recent report that a Chicago steel company is to build a strip mill in the industrial district skirting the southern boundary of Detroit. In the first place, the company is understood to have denied the report; moreover, it has turned out that the site which the company is reputed to have acquired recently became the property of a Pittsburgh forging concern which contemplates erection of a plant when expansion of its business with the automobile industry warrants the expenditure. Land is so cheap at present that it was thought advisable to buy the site, even though construction may not get under way until next year.

Aluminum Use Increasing

THERE is an increasing number of aluminum alloy gasoline truck and trailer tanks. A Milwaukee company is operating a tank truck of aluminum, the underframe as well as the tank itself being made of that material. The additional cost of the aluminum tank was $1,000, and it is figured that the savings due to transportation of less dead weight make up for the extra expense in eight months. The National Refining Co. operates a number of 750-gal. semi-trailer units, each weighing 11,035 lb. The size was duplicated in aluminum, resulting in elimination of 1920 lb. of weight, equivalent to more than 300 gal. of gasoline. The entire semi-trailer, with the exception of such parts as brake drums, brake rods, springs and axles, is made of aluminum alloy. The tank itself and parts such as can racks, drop panel side racks, drum carriers, piping, hose carriers and bolsters, were manufactured by the Davis Welding & Mfg. Co., Cincinnati. The semi-trailer, of 110-in. wheelbase, was built by the Fruehauf Trailer Co., Detroit, of aluminum alloy structural shapes and sheets.

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Surface Combustion Corpn., Toledo, Ohio, has recently installed a carbottom annealing furnace in the plant of the St. Louis Steel Castings Co., St. Louis. The furnace treats miscellaneous steel castings at 1650 deg. F. The work to be treated is rolled into the furnace on a car, an electrical door-lifting mechanism being at each end of the furnace. The furnace also has an electrically operated control unit, which is actuated from the heat control equipment. Its capacity is 2000 lb. per hr.

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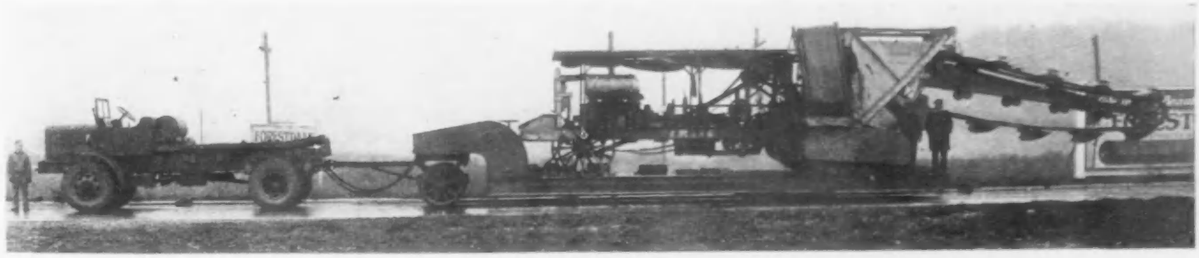
Total 1929 sales by 81 saw manufacturing establishments amounted to $21,996,000, of which $11,549,000, or 52.5 per cent, represented purchases by independent wholesalers, according to the Bureau of the Census. Sales to industrial users, such as sawmills, woodworking and metal-working shops, machine shops, etc., constituted 25.8 per cent.



THIS photograph of a motor truck of exceptional size and carrying capacity was sent to THE IRON AGE by the Four Wheel Drive Auto Co., Clintonville, Wis., as a result of the publication in the May 14 issue, page 1649, of an English truck of similar design and size. The Four Wheel Drive Auto Co. states that about 50 trucks of this size have been placed in service in the United States during the past year. One of these trucks in use at Milwaukee is said to have hauled 165 tons with ease on a 10 per cent grade, and speeds of 10 to 15 miles per hr. with 100-ton loads have been attained on level roads.

▲▲▲ PERSONALS ▲▲▲

ADOLPH RIDER, JR., who has been identified with the Lukens Steel Co. since 1922, has been made president of Lukens & Co., Inc., which has been organized by the Lukens Steel Co. to handle direct mill sales in New Orleans. The change was made because of the recent sale of its warehouse and fabricating plant in New Orleans to the Jones & Laughlin Steel Corpn. Prior to his connection with the Lukens company, Mr. Rider was associated with the New Orleans office of the Carnegie Steel Co. and later with the Midvale Steel & Ordnance Co. and the Cambria Steel Co.

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ERIC H. EWERTZ, consulting engineer, New York, has been awarded the Samuel Wylie Miller Memorial Medal of the American Welding Society for 1930 "for his pioneering in the development and application of arc welding." Since 1912, when he first succeeded in utilizing electric arc welding in marine construction, Mr. Ewertz has been an outstanding exponent of the welding art. He was president of the American Welding Society in 1924.

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J. C. MCQUISTON, general advertising manager for the Westinghouse Electric & Mfg. Co., East Pittsburgh, and one of the most widely known industrial advertising executives in the United States, has announced his retirement, effective June 1. He has been identified with the Westinghouse company for 29 years, and served for a time as president of the Association of National Advertisers.

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O. T. KREUSSER, test engineer, Fisher Body Corpn., has been elected chairman of the Detroit section of the Society of Automotive Engineers. GEORGE B. ALLEN, chief engineer, Dodge Brothers Corpn., was named secretary and F. W. MARSCHNER, western sales manager, New Departure Mfg. Co., treasurer. E. S. MACPHERSON, assistant chief engineer, Hupp Motor Car Corpn., will serve as vice-chairman representing passenger car activities, and W. S. PRITCHARD, factory manager, Detroit Aircraft Corpn., as vice-chairman representing aeronautic activities.

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FRANK THORNTON, JR., recently manager of residence engineering in the general engineering department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, has been appointed manager of association activities of that company, succeeding R. W. E. MOORE, who has resigned.

ADOLPH RIDER, JR.

Mr. Thornton was graduated from the University of Missouri in 1908, and has been identified with the Westinghouse company continuously since that time. He has been especially interested in electric heating and was for a time manager of the company's electric heating engineering department.

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EDWARD J. MILLER, president of the St. Louis Screw & Bolt Co., St. Louis, has been named by the St. Louis Public Service Co. to represent it in arbitrating the wage differences between the company and union employees. Former Mayor Kiel has been selected by the workers. The two will select a third arbitrator.

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BRADLEY STOUGHTON, head of the department of metallurgy, Lehigh University, Bethlehem, Pa., has been elected president of the Electrochemical Society for the 1931-1932 year.

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H. W. BISHOP, JR., has severed his connection as general sales manager of the Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa. The sales department has now been placed under the direct supervision of C. WILSON, JR., vice-president and general manager.

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A. C. MORRIS has been appointed production control superintendent of the Buick Motor Co., Flint, Mich. He joined the Buick organization in 1911 as a member of the inspection department, where he remained up to the war. Following the war he became associated with the production department. He succeeds C. D. SMITH who is retiring after 25 years of active service. Mr. Smith joined Buick when the plant was located at Jackson, Mich., first serving in the purchasing department and later in the production department.

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FRANK BAACKES, Jr., formerly in the Cincinnati sales office of the American Steel & Wire Co., is now representing the Keystone Steel & Wire Co., Peoria, Ill., in the sale of its products to certain industrial and jobbing trades in the Chicago territory. Mr. Baackes has opened an office at 1 North LaSalle Street, Chicago.

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E. L. COCHRAN has resigned as superintendent of the Corrigan-McKinney Steel Co. properties at Bessemer, Mich. A. E. REDNER, formerly assistant superintendent, has been promoted to the superintendency.

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HENRY J. MOORE, district manager of the Firth-Sterling Steel Co., has been elected chairman of the Hartford, Conn., chapter of the American Society for Steel Treating.

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CHARLES E. VOSE, consulting traffic engineer, will be the guest of the Boston chapter of the Institute of Scrap Iron and Steel, Inc., on May 28.

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H. M. PIERCE has become associated in a sales capacity with the Detroit office of the Newton Steel Co.

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L. M. CROSBY, assistant manager and purchasing agent of the Dail Steel Products Co., Lansing, Mich., has been elected vice-president of the Michigan and Indiana district of the National Association of Purchasing Agents.

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JOHN R. IDE has been appointed district sales representative at Detroit for the LaSalle Steel Co., Chicago, with offices in the General Motors Building.

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GRAY I. MORRISS has been appointed sales engineer of Arthur G. McKee & Co., with headquarters at their Eastern office, 120 Broadway, New York. Mr. Morriss was connected with the American Radiator Co. for many years and recently was in charge of

the New York office of the Kerotest Mfg. Co.

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ARTHUR YOUNG, Industrial Relations Counsellors, New York, and J. W. DIETZ, personnel manager, Western Electric Co., have been named members of an advisory committee to a Council of Personnel Administration which President Hoover has established to develop an effective system of personnel management in the Federal Government.

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EDWIN D. HASKELL, 2 Rue Chauveau-Lagarde, Paris, is spending a number of weeks in the United States to introduce a number of patents and patented processes and to arrange for American representation in France. His headquarters are at room 1002, 267 Fifth Avenue, New York.

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W. L. LEWIS, vice-president in charge of finance of the Chicago Pneumatic Tool Co., New York, has been elected executive vice-president of the company. Mr. Lewis was formerly assistant comptroller of the Bethlehem Steel Corpn.

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W. T. DONKIN has been elected chairman of the Cleveland chapter of the American Society for Steel Treating. He is metallurgist for the Cleveland Wire Spring Co. Other new officers are: Vice-chairman, W. E. BENNINGHOFF, sales engineer, Cleveland Electric Illuminating Co.; secretary-treasurer, H. B. PULSIFER, metallurgist, Ferry Cap & Set Screw Co.

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HOWARD J. MCGINN, vice-president and general manager, Reliance Mfg. Co., Massillon, has been appointed vice-president in charge of sales of the Eaton Axle & Spring Co., Cleveland, which recently acquired the Reliance plant. W. H. CRAWFORD, president of the Reliance company, will remain in charge of Reliance operations.

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H. G. DALTON, Pickands, Mather & Co., Cleveland, has been elected a director of the Texas & Pacific Railway Co.

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FLOYD K. SMITH, formerly president of the Donner Steel Co. and later identified in a special executive capacity with the Republic Steel Corpn. in the Buffalo district, has been elected president of the Donner-Hanna Coke Corpn., succeeding the late Charles A. Collins. DON M. EDDY, who is president of the Hanna Furnace Corpn. of Delaware, has been made vice-president of the Coke company. W. W. HANCOCK has become secretary, E. S. MCDOUGAL, treasurer, and PHILIP S. SAVAGE, general manager.

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JOSEPH A. CARLIN, formerly receiver of the Hutto Engineering Co., Detroit, has been appointed general manager, and FRANK J. JESCHKE, sales engineer. BEN O. ISOM has returned to the company as representative for Detroit and Chicago territories, and WILLIAM F. TOEPFER represents the company in Philadelphia, New York and Boston districts. J. L. NAVIN has become field engineer for Cleveland, Pittsburgh and western New York. JAMES G. YOUNG will locate in Europe as the company's European representative.

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COL. C. A. THOMPSON, chairman of the board of the International Stacey Corpn., Columbus, Ohio, as chairman of the Ohio State Office Building Commission, delivered the introductory speech at the dedication of the new Ohio State Office Building.

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A. J. EBNER, of the staff of the Freyn Engineering Co., Chicago, returned on May 16 from a four months' sojourn in Germany, England, Holland and Luxembourg, where he investigated steel mill practices.

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GRANT B. MCLAUGHLIN, who for some years past has been manager of the Buffalo office of Rogers Brown & Crocker Brothers, Inc., becomes, effective June 1, associated with the Yates-Lehigh Coal Co., Buffalo. E. C. MAURER, also for many years in the Buffalo office of the Rogers Brown company, will join Mr. McLaughlin in his new connection.

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PHILIP KELLER, treasurer of the Frick Coke Co., Pittsburgh, retired on May 1, after 50 years of continuous service with the company. He is among the last of those who were associated with the late H. C. Frick many years before the formation of the United States Steel Corpn.

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R. H. BACON, who has been associated with Fairbanks, Morse & Co., Chicago, for the past six years, has been made manager of the pump sales division of the company, with headquarters in Chicago. He has been manager of the advertising and publicity departments since 1929.

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WALTER C. SHUNK has been appointed mining engineer of the Goodman Mfg. Co., Chicago, maker of electric mining machinery, succeeding the late Sidney W. Farnham.

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R. E. MCGEE, metallurgist of the International Harvester Co., has been elected chairman of the Quad-City chapter of the American Society for Steel Treating. GARNET PHILLIPS, metallurgist of the Frank Foundry Corpn., has been elected vice-chairman.

"Worst Is Over," Declares James A. Farrell

In the first speech he has made over the radio, James A. Farrell, president, United States Steel Corpn., and chairman of the National Foreign Trade Council, stated last Sunday night that the worst of the business depression is over and that the country is entering upon a period of increasing trade activity. Mr. Farrell's talk, which signalized the opening of the National Foreign Trade convention at the Hotel Commodore in New York this week, was a feature of the salute to export trade by the Westinghouse Electric & Manufacturing Co., East Pittsburgh. Mr. Farrell said in part:

"If we could solve our own problems we should avoid controversies that can have no immediate and practical effects upon American trade. Our recovery is not wholly conditional upon the solution of problems in other lands. We possess within ourselves the power to lead the world trade recovery. This power, to be effective, must be directed to the solution of our domestic situation. If we would aid the world, our efforts must begin at home.

"I am convinced that our worst experiences are behind us and that we are gradually entering upon a period of increasing trade activity. We face the future with greater confidence than in 1914, when our first national foreign trade convention met."

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Labor Turnover Was Unfavorable in April

Labor turnover rates for manufacturing in April have been obtained by the United States Bureau of Labor Statistics for 75 industries, employing approximately 1,250,000 people. The total separation rate was 3.41, against an accession rate of 3.06, showing a reduction of 0.35 per cent in number of employees in the plants surveyed.

This differed markedly among the groups of industries. Iron and steel showed a separation rate of 2.94, against 1.69 accessions for each 100 on the payroll. Similarly, foundries and machine shops showed a separation rate of 4.61 with 3.08 accessions. On the other hand, the automobile industry, with a separation rate of 3.76, showed an accession rate of 5.21, indicating a gain of 1.45 per cent in employment during the month.

Analyzing the separation rates, almost precisely one-third of all employees leaving the employ of their respective companies came from voluntary quits. Discharges averaged one to every 11 total separations. Layoffs accounted for more than one-half the total, at 1.96 against 3.41 total.

OBITUARY

HARRINGTON EMERSON, consulting engineer, writer and educator, New York, died May 23, in his seventy-seventh year.

Although most widely known perhaps for his efficiency engineering work, Mr. Emerson had been very active previously in other fields. Born in Trenton, N. J., in 1853, he was educated at the Royal Bavarian Polytechnic and at universities in Italy and Greece. In 1876 he became professor of modern languages at the University of Nebraska, and from 1882 to 1896 he was in the banking and realty business. Following this, he represented for two years a British syndicate, examining industrial plants and mines in the United States, Canada and Mexico. Other activities of this period were the establishment of some of the first long-distance mail routes in Alaska, investigation of coal deposits of the North American west coast, and investigation on the Northern submarine cable route to Asia.

An accomplishment that brought him wide recognition was the efficiency methods installed on the Santa Fe system. For 25 years beginning with 1900, he was president of Emerson Engineers, Inc., New York; during 1925 he established Harrington Emerson, Inc., also of New York. In 1921 he was assigned to report on railroads and bituminous coal mines for the Committee for the Elimination of Waste in Industry for Herbert Hoover, then Secretary of Commerce.

Books written by Mr. Emerson include: "Efficiency as a Basis for Operation and Wages" and the "Twelve Principles of Efficiency"; his "Lessons in Personal Efficiency" gained wide circulation. He contributed papers and discussion to the proceedings of the many societies and associations of which he was a member. In 1930 the Society of Industrial Engineers, of which he was a director and one of the founders, honored Mr. Emerson with its annual trophy.

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ARTHUR STENNETT MARTIN, head of the Firthite and engineering departments of the Firth-Sterling Steel Co., McKeesport, Pa., died on April 21 at the Homeopathic Hospital in Pittsburgh. He was born in Elizabeth, N. J., 46 years ago and was graduated as a mechanical engineer from Cornell University in 1910.

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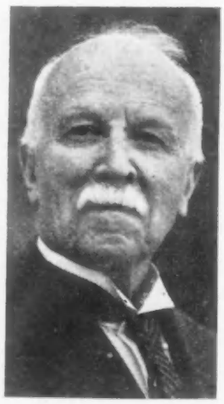
ARTHUR J. MOXHAM, a founder of the Johnson Co., Johnstown, Pa., which subsequently became a part of the Lorain Steel Co., died at Great Neck, Long Island, on May 17, aged 76 years. After leaving the Johnson Co., Mr. Moxham became associated with H. W. Whitney, of Boston, in the formation of the Dominion Iron & Steel Co.



HARRINGTON EMERSON

PORTER S. KIER

PORTER S. KIER, vice-president and treasurer of the Kier Fire Brick Co., Pittsburgh, and widely known in the refractories industry, died suddenly at his home in that city on May 24. He had been associated with this company, which was founded by his father, the late William L. Kier, for more than 25 years. Born at Pittsburgh, he attended the University of Pittsburgh and later the University of Pennsylvania. He began his business career with the Bank of Pittsburgh, and later was associated for a time with the First National Bank at Pittsburgh before joining the Kier company. He was a director of the American Refractories Institute, and was prominent in civic affairs at Pittsburgh. Mr. Kier was 54 years old.

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LOUIS J. MUELLER, JR., president, L. J. Mueller Furnace Co., and its subsidiary, Manufacturers Foundry Co., Milwaukee, died after a long illness May 4, aged 65 years. He served for many years on the executive committee of the National Boiler and Radiator Institute.

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THEODORE E. MILLER, one of the founders of the Mertes-Miller Co., Milwaukee, boiler works, died May 5, aged 81 years. He was a native of Germany but came to America as an infant, establishing the boiler business in 1870. Mr. Miller retired in 1915.

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GEORGE T. ROWLAND, president of the William & Harvey Rowland Co., maker of automobile springs, Frankford, Pa., died of a heart attack in Detroit, May 16, aged 55 years.

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EDWARD DEAN ADAMS, a dominant figure in engineering, banking and industry for more than half a century, died at his home in New York, May 20, aged 85 years. As an engineer he originated the system of hydroelectric power development employed at Niagara Falls.

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ELI OURY, founder of the Wellston Iron Works, Wellston, Ohio, died at his home in that city, last week. He was 65 years old and was widely known among the trade in Ohio.

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SAMUEL W. PARR, emeritus professor of applied chemistry at the University of Illinois, died on May 16 at Urbana, Ill., after an illness of several months. He was widely known for his process for coking Illinois coal and for the Parr formula for classifying coal.

Wage Scale Renewed for Sheet and Tin Mills

The Western Sheet and Tin Plate Manufacturers Association and the Amalgamated Association of Iron, Steel and Tin Workers renewed their wage contract as of July 1 next, following a conference of several days at Atlantic City, N. J. The existing wage rates will be continued. A joint statement issued by the chairman of the two organizations reads:

"In refusing to incorporate wage reductions in the new contract, both the manufacturers and the labor union heads feel that they are but agreeing with the dictum of President Hoover that wage slashes at this time will retard seriously the restoration of normal business conditions."

The employees' organization requested that a 6-hr. day be granted to relieve unemployment in the industry, but the conferees finally decided the work-day at 8 hr., as in the present contract. Manufacturers and their employees may, however, reduce the hours of work to six per day to meet local conditions, if advisable.

Barometers Show No Definite Recovery

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

FAVORABLE FACTORS

1. Average industrial production apparently as far below normal as usual in major business recessions.
2. Retail trade in good volume.
3. A broad decline in employment has been broken by more-than-seasonal recovery in first quarter.
4. Automobile production increased more than seasonally in April.
5. Machine tool orders decreased less than usual in April.
6. Considerable progress in production economies.
7. Business failures less numerous, following what may have been a peak.
8. Much credit liquidation; total bank loans down and near normal with relation to deposits; speculative credit largely liquidated; New York money rates abnormally low compared with commercial paper and bond yields.
9. Light mercantile inventories.
10. Growing realization of the seriousness of the depression.

UNFAVORABLE FACTORS

1. Commodity prices continue to decline; raw materials not stabilized; maladjustments in price structure.
2. Production not sufficiently curtailed in some cases, —increased stocks of commodities and weak markets; stocks of some commodities large compared with unfilled orders or shipments.
3. The P-V line reacted in April and is below normal.
4. Consumer purchasing power low: Unemployment, low farm income, dividend cuts.
5. Foreign trade low and declining; no indication of general improvement in foreign business conditions.
6. Building activity at low levels; contemplated new construction declines.
7. Stock market liquidation incomplete.
8. Bonds weak (except those presenting maximum safety).
9. Primary bank credit still somewhat over-extended, and artificial money rates delay liquidation.
10. Domestic and foreign political uncertainties; wage discussions not rational, and class conflict threatened.

UNFAVORABLE factors are still the stronger and more positive, making it impossible to forecast an early sustained recovery. The very mixed condition is indicated by various barometers. Pig iron production increased in April, while steel production decreased. Unfilled orders of the Steel Corporation decreased less than usual; those for cotton cloth more than usual. Retail trade gained, while imports declined. Government bonds rose, while industrial and railroad bonds declined.

Probably this condition marks the passing of the peak of the first-quarter rally in business and a rounding off into a "secondary" decline. We consider January to have been the primary bottom of the business curve. It now remains to be seen whether further recession (led by the stock market, foreign trade and steel production, with declining prices and incomplete credit liquidation in the background) will carry to new low levels. This is easily possible, as in 1894.

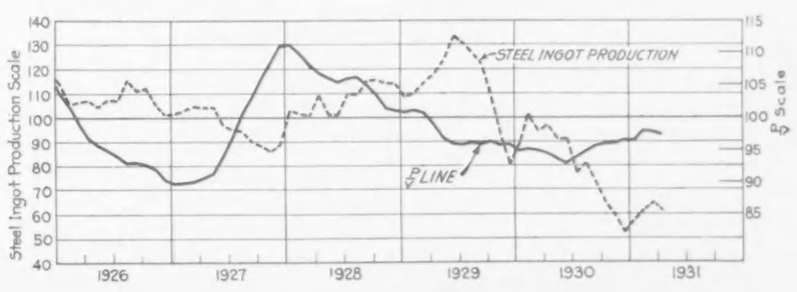
Among conditions most strongly casting doubt upon forecasts of early recovery are the following: Continued weakness in basic raw material prices; renewed decline in the P-V line; declining exports; still burdensome stocks of metals, cotton, silk, sugar, wheat and rubber; absence of complete correction of the maladjustment among commodity prices; low level and poor prospects in building activity, automobile production, farm income and foreign trade; and uncertainty concerning radical political action and developments in the labor problem.

But, while we are inclined to doubt that the absolute bottom of the business curve has been seen (and the more so because of the artificial support that has been given), it seems fairly sure that no further and large or precipitate decline in industrial activity lies ahead, barring widespread strikes. Current industrial production seems close to the irreducible minimum, based on current consumption and replacement requirements. Probably there has been sufficient liquidation of credit to relieve the worst strains.

As to recovery, we find no basis for a definite forecast. Many "barometers" which work well in minor cycles have indicated recovery. There have been upturns in machine tool orders and in Steel Corporation unfilled orders. Blast furnace activity increased in first quarter. "Bottom levels" have been touched by "adjusted" production curves. Money rates are extremely low and have declined for months.

But some of these barometers are erratic and uncertain. All are outweighed by fundamental maladjustments, national and international. Thus we must fall back on a broad economic analysis, and the readjustment of values and past excesses must be completed before recovery can be expected.

When liquidation in surplus stocks of commodities begins in earnest, prices of commodities are restored to more normal relationships, and wages of certain groups of organized labor are restored to a sounder working relationship to general values, confidence will be restored and recovery become probable.



A reaction in the P/V line and its below-normal level indicate a setback in the prices buyers are willing to pay, and suggest some further curtailment and lower prices.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

The Words of a Prophet

RARELY has the iron and steel industry subjected itself to such critical self-examination as at the spring meeting of the American Iron and Steel Institute held in New York last week. The frankness with which current problems were discussed approached bluntness at times, but emergencies call for plain speaking and resolute facing of facts. The extent of demoralization in the steel business, as laid bare by the speakers, particularly by James A. Farrell, came as a shock to the public at large and jolted the industry itself into a fuller realization of the consequences of further aggravating the evil.

While there is undoubtedly difference of opinion among steel executives as to remedies for the ills now besetting them, the views expressed by those who addressed the institute were in the main concordant, notwithstanding superficial variances which were given exaggerated publicity in the daily press. It is especially noteworthy that the ideas expressed contrast sharply with traditional practices of the iron and steel trade. Reduction of steel wage rates, which was formerly a matter of course in a period of depression, was condemned as unfair to a working force that is on short time, as conducive to fear and to paralysis of consumer buying and, finally, as uneconomic and offering little actual relief in the struggle to depress costs.

President Schwab pointed out that labor costs in the steel industry have already been sharply deflated. Wage scales, generally speaking, have not advanced since 1923 and meanwhile unit labor costs have been greatly reduced through gains in productive efficiency. Mr. Farrell decried such wage cuts as had been made as unfair to the companies that are trying to maintain stable rates and as the wrong method of meeting the difficulties confronting the industry. The way out of the present predicament, in his view, is to offer determined resistance to unfair buyers. Such a course, he indicated, is imperative or steel companies will soon find themselves unable to earn their primary obligations.

His view on prices, like that on wages, represents a radical departure from historic conceptions. It is a far cry from the old Carnegie maxim that the way to lift the market is to get under it, and, being unaccompanied by any plea for a revision of anti-trust legislation, also contrasts with the attitude that prevailed in the periods when the industry experimented with "hard and fast" trade agreements.

President Schwab, in remarks that were substantially in accord with Mr. Farrell's, pleaded for an "understanding" among steel leaders that would not infringe on existing statutes, appealing to their sense of honor to discontinue uneconomic competitive practices. Similarly Eugene P. Thomas, vice-president, United States Steel Corpn., urged a spirit of mutual consideration and tolerance, springing from individual initiative and without the support of Government assistance. "In cases where supposed (Governmental) relief has been fostered, such as farm products and merchant marine, disastrous results have occurred," Mr. Thomas declared. "We do not require paternalism, but we do ask to be let alone."

This unqualified declaration of policy leaves little doubt that the steel industry has definitely abandoned all hope or desire for a revision of the anti-trust laws. It is doubtless realized that Government sanction of trade agreements inevitably leads to other restrictions on industrial management that inhibit initiative and stifle enterprise. Moreover so-called "enforceable" agreements offer little advantage in the last analysis over reliance on voluntary cooperation. In both cases the harnessing of competition depends on the good faith of the individual. The dishonest or perverse can find ways of circumventing State-sponsored agreements, just as they find methods of upsetting and demoralizing free and open markets.

And while, as Mr. Thomas concedes, some of the evils of competition will never be stamped out, there is reason to hope that a growing consciousness of interdependence and mutual interest will greatly mitigate them. Such a prospect may not be wholly satisfying to those who regard "preaching" as a weak remedy for pernicious practices. But preaching has proved the only effective way of raising the level of private morals and it likewise may, in the long run, turn out to be the best means of bringing about lasting improvement in business standards. The late Judge Gary's repeated exhortations to apply the Golden Rule to business are beginning to impress even the most cynical as the words of a prophet.

SOME financial people still seem to believe that industry is wantonly over-producing. One of their number in a recent public utterance named this as a continuing cause of our present troubles. He gave no credit to the manufacturer for trying to balance his output in terms of current demand. He also brought the charge that there was too much building of new capacity, overlooking the fact that much of this was done, especially after the conferences of big business in Washington eighteen months ago, as a measure to maintain employment, and without requiring special financing. New equipment and even plant likely to effect marked manufacturing economies have warrant beyond the ken of some critics. Meanwhile, we have not seen much

of the stimulation of consumer buying that was supposed to follow the expansion of loans against the so-called soldier adjusted compensation certificates, although the banker-speaker considered such measures the kind of thing to restore prosperity.

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A Forward Step in Research

OF high import to the whole steel industry was the paper read at last Friday's meeting of the American Iron and Steel Institute by F. N. Speller, director, department of metallurgy and research, National Tube Co. It was admirable as an able and thorough-going review of the present status of research work in the iron and steel industry; but it was more. What makes it notable in the proceedings of the institute is the author's proposal of a program of action, which rightly carried out will set the industry far forward in the solution of its chief problems, both technical and commercial.

Most impressive is Mr. Speller's account of what has been accomplished by cooperative technical work in iron and steel in the United States and abroad, particularly in Germany and Great Britain. Yet in comparison with some other domestic industries steel making has lagged. The chemical and allied industries spend annually in this way 2.04 per cent of their capital. Automotive and rubber industries come next. But the estimate for the steel industry is but 0.04 per cent of its invested capital—a showing not highly creditable in view of the country's annual outlay of $200,000,000 on applied research.

Mr. Speller's definite recommendation is that the steel industry take over and put on a more permanent basis the cooperative research work on steel that has been carried on for the past four years at Pittsburgh by the Bureau of Mines and the Carnegie Institute in conjunction with representatives of various steel companies. The results have been of high value; so much so that the Bureau of Mines, which aims only to initiate and assist in such effort, feels that the time has come to hand the work over to the industry. The concrete proposal that will now come to steel manufacturers is the formation of an association which through a research board shall plan work on noncompetitive technical problems submitted by member companies or by associations of engineers or consumers.

THE IRON AGE heartily seconds the plan, all the more heartily because in season and out of season we have held before the steel industry as a main objective cooperative research to the end that steel may take a larger place in American industry and its uses be more rapidly extended. Mr. Speller does well to emphasize the need that the study of market and economic conditions go hand in hand with technical research, since "it is possible to spend too much time on problems having to do with lowering costs and increasing production and not enough on developing a wider field of consumption for the product."

Before the year is out we look to see the suggestion of Mr. Speller's paper take form in an organization and a program. Then at not too long an interval should come similar action putting the industry behind a plan for cooperative market research. Present conditions only reinforce the opinion we have heretofore expressed that market laboratories have fully as large possibilities of return to the producers of steel as any that have been laid down at such lavish outlay for chemist and physicist.

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Fifteen Years of Fact Finding

IT must be a source of great satisfaction to those who launched it that the National Industrial Conference Board is what it is today. It has lived up to the expectations of observers on the side lines, if indeed it has not exceeded them.

It was fifteen years ago at about this time that the organization got under way, but announcement of its formation did not come until November, 1916, in connection with the annual meeting of the National Founders' Association. The daily press then forthwith discovered the new association as a super-anti-labor-union body. It knew the foundry masters as being against union domination, though it did not know of their good works and their broad attitude with regard to the well-being of the wage earner. Thus the conference board got off to a bad start, so it seemed.

As a matter of fact, the handicap was soon overcome. The public began to read of the facts the board was compiling. More and more its studies were receiving prominent consideration. Confidence in their reliability developed, and it was realized the board was functioning as promised, as an economic fact-finding agency, publishing results without color of opinion.

That the institution, now substantially quasi-public, could achieve so much in the short span of fifteen years, gives much promise for the next period. It will be cheering if the hard times do not contract its budget of expenditures. There could hardly be a time when its investigations should be less subject to curtailment. It is probable its membership appreciates all this.

Meanwhile it is a tribute to the high purposes of the board that funds have been made available over these years for the expanding activities. As facts of broadened application multiply, we are better able to interpret them, and yet it would be highly helpful if the board itself could at times give its judgment relative to its findings. THE IRON AGE congratulates the National Industrial Conference Board on its record.

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Post-War Activity and Depression

PERHAPS there is not enough disposition to relate the period of great trade activity we had after the World War with the war itself. Undoubtedly there is an important connection and we might have clearer vision as to where we stand now and what is likely to come next if we study the connection and give it full value.

During the war there was a thought in many quarters that a great depression would occur afterward.

It was put at the time that people would "pay for the war." In other quarters the thought was there would be great activity and expansion.

On account of these divergent views, there was given in the annual number of THE IRON AGE of Jan. 4, 1917, an article (page 48) on what occurred after our Civil War of 1861-5 and the Franco-Prussian War of 1870. A chart was presented, covering 1860 to 1875 inclusive, showing for the United States New York clearings, failures, railroad mileage, pig iron production and prices and imports and exports; for France, imports and exports, and for England, imports and exports and percentage of labor unemployment.

The thesis was that after great wars there could be much activity, but that one should not take this for granted, and the article concluded with the following paragraph:

> What the historic facts show is that nations can be prosperous after a war, whether their own or that of other nations. It is not proved that prosperity must come. Prosperity is due to economy and industry. The people must produce and must not waste. War has a crippling effect and it also has a stimulating effect. Whether a war, of itself, produces prosperity depends on whether the stimulus exceeds the crippling.

Now we are able to view things in the retrospect. The stimulus did exceed the crippling, and very greatly so. The World War was one of industries, which were given a great impetus. It was found that more things could be done than had been imagined and research was enormously broadened. The United States found itself in very strong financial position and loaned much money to the rest of the world.

After the Civil War there was a period of great activity, with only very short and small set-backs, up to the Jay Cooke failure of Sept. 18, 1873, and the big panic the day following, the period covering eight years and five months.

In view of what has since occurred, the short depression centering in 1921 cannot be regarded as "the" depression after the World War, if one were to occur, but at the same time it may have tended to make the end of the general post-war activity come at a later time. For the world at large there is no particular time for the ending. England had little activity at all, some other countries lost their activity before our stock market collapse in October, 1929, while France kept going a while longer. One might say, roughly, that depression came about 11 years after the Armistice.

Comparing 8½ years and 11 years we have a difficulty. One would be inclined to expect things to move faster rather than slower, but the idea that fundamental principles were at work in both cases should by no means be dismissed. One point may be that the World War furnished a greater stimulus, and another point may be that after the Civil War we were on a paper basis and much business had to be done on promissory notes, making men more conservative and bringing on the shaking out sooner than after the World War, when we were on so sound a basis, whereby we could indulge in excesses for a longer time and to a greater extent.

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Steel Wage Rates Should be Maintained

(*Concluded from page* 1748)

item of expense and every method of operation. We have liquidated overhead costs. We are ready to handle the upturn of business as it comes without wasteful operation or extravagant methods, which always result when production facilities are hastily improvised. I am unable to predict that any particular circumstance is going to bring about the return to good business.

I am asking you to accept only the counsel of common sense and experience in saying that the outlook today is better than it has been for many months past. I wish only to point to the production rate of 30,000,000 tons. The last prosperous year in which we had so low a production (not forgetting the depression year of 1921) was 1910. Thirty million tons was adequate for the normal needs of our people in 1910; not excessive, but adequate. But in 1910 we had only 92,000,000 people, 25 per cent fewer than today. We had virtually no automobiles, no radios, and the era of high buildings was just beginning. We have been rationing out steel this year on a starvation diet. Before many months elapse that situation will be remedied.

I do not think we need to dwell on the exact time of full business recovery. No one can predict it, and there is a wise old saying that "The watched pot never boils."

We have come through a severe liquidation period, and have adjusted our affairs in an orderly and effective way. We shall feel our way carefully through the slack summer season, and if necessary we can face a much longer siege without alarm.

There are many signs of stirring in our economic life. The very fact that we have faced this situation and adjusted ourselves to it is a preliminary to the better times, to the favorable upward reaction. We want to keep pulling for the shore. We must not lose headway by resting on our oars, but we can be cheered by the knowledge that "the tide is coming in."

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Plating Chromium on Aluminum

SUCCESS in electrically depositing, directly on aluminum, thin layers of chromium which have fairly good resistance to salt spray and atmospheric corrosion is announced in a paper, "Chromium Deposits Directly on Aluminum," by Harold K. Work and Charles J. Slunder, of the Aluminum Research Laboratories, Aluminum Co. of America, presented at the recent general meeting of the Electrochemical Society at Birmingham late in April.

Such deposits have a gray color on leaving the plating bath and must be buffed if a higher luster is required. These deposits protect aluminum to a marked degree from alkaline corrosion.

Downward Trend of Steel Production Is Unchecked

INGOT Output Continues to Recede Slowly, Now Averaging 44 Per Cent—Scrap Lower at Pittsburgh—Basic Iron Down $1 in Valleys

NEITHER the tempo of buying nor the trend of prices and production has been noticeably affected by the frank airing of views at the recent meeting of the American Iron and Steel Institute. Demand remains sluggish and in the aggregate continues to taper; prices in scattered instances have given further ground but in the main are unresponsive, owing to the dearth of new business; output is still slowly declining.

Sentimentally, however, the effect of bringing the industry's difficulties out into the open has been salutary. Steel executives were jolted into a fuller realization of their present straits and the consequences of a further aggravation of market instability. Their apprehensions have been heightened by the unchecked rise of costs as mill output grows more intermittent.

AGGREGATE current specifications for such products as sheets, strips, cold-finished bars and wire products are hardly sufficient to justify more than a two-day a week operation. Releases in other products offer no promise of early improvement. Structural steel and reinforcing bar mills are holding their own but fail to show expected gains. Mills benefiting from recent pipe line awards have been able to increase their schedules somewhat, but production of standard pipe reflects no seasonal expansion. Rail mill operations continue to decline and tin plate output, although still at a 70 per cent rate, is headed downward.

Raw steel production, less erratic than finished steel output, has again given ground at Pittsburgh, Chicago and Buffalo and now averages 44 per cent for the country at large, compared with 45 per cent a week ago.

PRICE changes in primary materials are restricted to a few scattered declines. Heavy melting scrap *is off 25c. a ton at Pittsburgh* and Detroit and 50c. at Buffalo. THE IRON AGE composite for heavy steel scrap has declined from $9.83 to $9.75 a ton, the lowest price with the exception of the fall of 1914 in 20 years.

Basic pig iron in the Valleys has broken $1 a ton on a large sale of surplus steel works iron to a non-integrated steel maker. THE IRON AGE composite price for pig iron has receded from $15.79 to $15.63 a ton, its lowest level since October, 1915.

Finished steel prices show little change in the absence of interest in third quarter business. Strip mills are making some effort to raise quotations on contracts for the next quarterly period, and sheet mills hope to make recently revised schedules effective, but actual market tests are still lacking. Sellers of standard pipe have advanced quotations slightly on direct shipments, partly offsetting a recent reduction.

PIPE line business of the week includes an award of 6000 tons of 8-in. seamless for the Memphis Natural Gas Co. to the National Tube Co. The Lycoming Natural Gas Co. is inquiring for 15,000 tons of 20-in. pipe for a gas line in Pennsylvania and New York. The low bid on the fabrication of 35,000 tons for the Hetch Hetchy pipe line, San Francisco, was submitted by the Western Pipe & Steel Co.

Reinforcing bar lettings, at 9100 tons, are the largest for any week since mid-April. Structural steel awards and inquiries, at 20,000 tons each, are subnormal.

Automobile consumption of pig iron and steel continues to decline. May promises to fulfill expectations of a peak output of 370,000 cars, but a decline in production next month is becoming increasingly certain.

Copper, during the past week, dipped to 8.50c., delivered Connecticut valley, the lowest price in history.

THE IRON AGE composite price for finished steel is unchanged at 2.114c. a lb.

PITTSBURGH — Downward Tendency in Steel Continues —Basic Pig Iron Off $1 a Ton

PITTSBURGH, May 26.—Declining tendencies in steel production and specifications were accentuated in the last week, and the industry in this district seems to be reaching its seasonal low levels earlier than had been anticipated.

A downward trend in releases from the automobile industry has been noticed in the last few days, and has been reflected immediately in orders for sheets, strip steel and bars. The change has been less perceptible in other consuming lines, although small manufacturing users seem to be reducing their individual orders more and more each week, and are taking out steel at a rate which is exceedingly discouraging to mills. Quick delivery is always asked, and, with aggregate tonnage on such products as sheets, strip, cold-finished bars and wire products hardly sufficient to justify more than a two-day a week operation, the opportunity to run profitably is almost entirely lost.

Shipments of structural steel and reinforcing bars are holding up, but there has been little increase. Plate mills are getting fair specifications from barge builders, but railroad car makers are very inactive, and the carriers are doing little repair work in their shops. At the same time releases on rails and accessories from the railroads have fallen off much earlier than might be expected, and output during June will be seriously affected. Mills benefiting from recent line pipe awards have been able to increase their production slightly in some lines, but the aggregate total of this business has not yet affected Pittsburgh district operations as a whole to a noticeable extent.

Tin plate production has been fairly well maintained recently, following a gradual tapering off in the last four or five weeks. The industry is still running at about 70 per cent of capacity, representing a considerably better average than any other finishing line.

Raw steel output in the district is estimated at about 42 per cent of capacity, a slight decline from last week. Production in the Wheeling and Ohio River territory is unchanged, and output in the Valleys has been maintained at somewhat lower levels than those prevailing at Pittsburgh. In the finishing mill line reduced output is in evidence in sheets, strip, cold-finished bars and bolts and nuts.

Finished steel prices are unchanged, with makers and users showing little interest in third quarter business. Strip mills are making some effort to raise quotations on contracts for the next three months, and sheet mills are anxious to make recently adopted price schedules effective. Sellers of standard pipe have advanced quotations slightly on direct shipments, with discounts on black pipe now quoted at one point off, plus 5 and 2½ per cent, compared with one point and two fives, which has prevailed recently.

In the raw material market interest is centered in a recent purchase of basic pig iron by a non-integrated steel company, which brought out a price considerably under recent quoted levels. Scrap is weaker in a quiet market, with the average price of heavy melting steel off 25c. a ton.

Tendency of steel operations and orders is still downward, bringing seasonal low levels earlier than usual.

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Sale of basic pig iron establishes prices at least $1 a ton below recently quoted level.

* * *

Scrap market continues weak, with heavy melting steel price average off 25c. a ton.

* * *

Releases of rails have fallen off. Flat rolled products and bars also affected by declining specifications.

* * *

Tin plate output at 70 per cent, making best showing of any branch of steel industry.

PIG IRON

A non-integrated steel maker in the Pittsburgh district has bought a large tonnage of basic iron for shipment during the second half at a price considerably under recent nominal quotations. Several sellers figured on this business, which was finally placed with a steel company having a surplus of iron. While the exact delivered price was not divulged, the sale clearly establishes the market on basic iron at at least $1 a ton under recently quoted levels. No changes are reported in the other grades of pig iron, demand for which is confined principally to carload lots for immediate shipment. With foundry, Bessemer and malleable iron quoted at $17, Valley furnace, the discrepancy in prices is rather unusual, but it has long been admitted in the trade that any large inquiry for the basic grade would bring out sharp price concessions in view of surplus stocks held by some steel makers.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$15.50 to $16.00
Bessemer	17.00
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Low phos., copper free	26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton f.o.b. Pittsburgh district furnace:

Basic	$16.00 to $16.50
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

SEMI-FINISHED STEEL

No new business is reported. Shipments this month are running considerably behind those of April. Prices on billets, slabs and sheet bars are nominally quoted at $29 to $30, Pittsburgh, with few transactions to test them. Forging billets are also dull, and shipments of wire rods have declined. The price on rods is fairly well maintained at $35, Pittsburgh or Cleveland.

RAILS AND TRACK SUPPLIES

New releases of rails and accessories scarcely justify the present rate of production, and further curtailment is looked for early next month unless better specifications are forthcoming from the railroads. Shipments during May will not fall materially under those of April. Light rails are dull; in the absence of buying the price continues at $34, Pittsburgh.

BOLTS, NUTS AND RIVETS

With demand from the railroads and the structural field rather light, movement of bolts and nuts is declining, and curtailment in automobile production during June will lead to a further falling off. The industry is operating at 30 to 35 per cent of capacity, and prices in the Pittsburgh territory are maintained at recent levels.

BARS, PLATES AND SHAPES

Output of structural steel in this district is slightly higher at one point, due principally to heavier shipments against certain previous contracts. Bar production, however, has declined somewhat, reflecting the lower requirements of the automobile industry as well as lighter consumption by general manufacturing consumers. Reinforcing bars alone are helping to maintain bar mill operating rates. Plates continue quiet, with tank fabricators running at reduced schedules, and barge yards alone making any

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	May 26, 1931	May 19, 1931	Apr. 28, 1931	May 27, 1930
No. 2 fdy., Philadelphia	$17.26	$17.26	$17.76	$19.76
No. 2, Valley furnace	17.00	17.00	17.00	18.50
No. 2 Southern, Cin'ti	14.69	14.69	14.19	16.69
No. 2, Birmingham	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*	17.50	17.50	17.50	19.00
Basic, del'd eastern Pa.	17.00	17.00	17.00	18.75
Basic, Valley furnace	*15.50*	16.50	16.50	18.50
Valley Bessemer, del'd P'gh.	18.76	18.76	18.76	20.76
Malleable, Chicago*	17.50	17.50	17.50	19.00
Malleable, Valley	17.00	17.00	17.00	19.00
L. S. charcoal, Chicago	25.04	25.04	25.04	27.04
Ferromanganese,seab'd,car lts.	**85.00**	80.00	80.00	94.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	*34.00*	36.00	36.00	36.00
Rerolling billets, Pittsburgh	29.00	29.00	30.00	31.00
Sheet bars, Pittsburgh	29.00	29.00	30.00	31.00
Slabs, Pittsburgh	29.00	29.00	30.00	31.00
Forging billets, Pittsburgh	35.00	35.00	36.00	37.00
Wire rods, Pittsburgh	35.00	35.00	35.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.65	1.65	1.65	1.70
Finished Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.65	1.65	1.65	1.75
Bars, Chicago	1.70	1.70	1.75	1.85
Bars, Cleveland	1.65	1.65	1.70	1.75
Bars, New York	1.98	1.98	1.98	2.08
Tank plates, Pittsburgh	1.65	1.65	1.65	1.70
Tank plates, Chicago	1.70	1.70	1.75	1.80
Tank plates, New York	1.93	1.93	1.93	1.98
Structural shapes, Pittsburgh	1.65	1.65	1.65	1.70
Structural shapes, Chicago	1.70	1.70	1.75	1.80
Structural shapes, New York	1.90½	1.90½	1.90½	1.95½
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.55	1.55	1.55	1.70
Cold-rolled strips, Pittsburgh	2.15	2.15	2.15	2.45

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel,	May 26, 1931	May 19, 1931	Apr. 28, 1931	May 27, 1930
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh.	2.15	2.15	2.25	2.55
Sheets, black, No. 24, Chicago dist. mill	2.35	2.35	2.35	2.65
Sheets, galv., No. 24, P'gh.	2.80	2.80	2.80	3.20
Sheets, galv., No. 24, Chicago dist. mill	2.90	2.90	2.90	3.30
Sheets, blue, No. 13, P'gh.	2.00	2.00	2.00	2.15
Sheets, blue, No. 13, Chicago dist. mill	2.10	2.10	2.10	2.25
Wire nails, Pittsburgh	1.80	1.80	1.90	2.15
Wire nails, Chicago dist. mill	1.95	1.95	1.95	2.20
Plain wire, Pittsburgh	2.20	2.20	2.20	2.30
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.35
Barbed wire, galv., P'gh	2.55	2.55	2.55	2.80
Barbed wire, galv., Chicago dist. mill	2.60	2.60	2.60	2.85
Tin plate, 100 lb. box, P'gh.	$5.00	$5.00	$5.00	$5.25
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	*$11.00*	$11.25	$12.25	$14.75
Heavy melting steel, Phila.	9.50	9.50	10.25	13.00
Heavy melting steel, Chicago	8.75	8.75	9.50	12.25
Carwheels, Chicago	**9.50**	8.75	9.50	13.75
Carwheels, Philadelphia	12.00	12.00	12.50	14.50
No. 1 cast, Pittsburgh	11.00	11.00	12.25	14.25
No. 1 cast, Philadelphia	11.50	11.50	11.50	14.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	12.75
No. 1 RR. wrot., Phila.	11.00	11.00	11.00	15.00
No. 1 RR. wrot., Ch'go (net)	7.50	7.50	8.00	11.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.40	$2.40	$2.50	$2.50
Foundry coke, prompt	3.50	3.50	3.50	3.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	9.12½	9.12½	9.87½	13.12½
Electrolytic copper, refinery	8.50	8.75	9.25	12.75
Tin (Straits), New York	22.75	23.50	23.75	31.75
Zinc, East St. Louis	3.30	3.35	3.40	4.62½
Zinc, New York	3.65	3.70	3.75	4.97½
Lead, St. Louis	3.60	3.60	3.90	5.40
Lead, New York	3.75	3.75	4.10	5.50
Antimony (Asiatic), N. Y.	6.40	6.50	6.85	7.35

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

sort of a satisfactory showing. The requirements of the railroad equipment builders have gradually tapered off, and little improvement is in sight in the form of new orders booked.

Mills are attempting to get consumers to specify against 1.65c., Pittsburgh, contracts taken at the beginning of the quarter, and most of the old business taken at lower figures has been wiped out. No intimation of third quarter quotations is available, but some sellers hope to maintain the 1.70c. figure named at the end of the last quarter. Prices on reinforcing bars are weak in most all sections of the country, with immediate Pittsburgh quotations fairly well maintained at 1.60c. to 1.65c.

COLD FINISHED STEEL BARS

The last week was very quiet, and operations are slightly lower at some plants. The industry is engaged at 30 to 35 per cent of capacity. Prices are holding at 2.10c., Pittsburgh.

TUBULAR GOODS

A Pittsburgh district producer has taken 6000 tons of 10-in. seamless pipe for a line in Tennessee. An inquiry for 15,000 tons of 20-in. material from the Lycoming Natural Gas Co. is active, but no other awards have been reported. Operations of seamless mills in the district are somewhat higher, reflecting the beginning of work on line pipe projects taken earlier in the month. Lapweld units are running at a low rate, and production of standard pipe is no higher than it was last month. Little seasonal expansion in demand for this product is reported. Boiler tubes are more active than other lines of tubing, and oil country casing is very dull.

WIRE PRODUCTS

Dullness in the wire market has been extended to the merchant products, and road mesh alone is showing real activity. Shipments of manufacturers' wire are running behind those of April. Nails are moving in small lots, and despite light purchases prices are softer. Carload lots are available in some cases at $1.80 a keg, Pittsburgh, but lower prices are not successful in driving in any tonnage. Manufacturers' wire is unchanged at 2.20c., Pittsburgh.

SHEETS

Business was very quiet last week, although a few of the large automobile producers asked for bids on their third quarter requirements. Several companies have submitted bids on this material on the basis of the new price schedules adopted recently for third quarter business. June specifications from the automobile industry are not coming in in significant volume, reflecting the uncertainty of operating schedules. Releases for sheets from the electric refrigerator and steel furniture industries are holding up and tack manufacturers have been busier. Culvert and roofing stock are not as active as they were earlier in the month. Operations are still declining. Activity on the part of Valley mills was somewhat higher last week, but has fallen off, and the average for the two weeks will not be above 40 per cent. The leading interest is not running its sheet mills at better than 35 per cent. Prices on small current orders are rather soft, but makers are making no commitments for third quarter and the situation can hardly be clarified for three or four weeks.

THE IRON AGE COMPOSITE PRICES

	Finished Steel	Pig Iron	Steel Scrap
May 26, 1931	2.114c. a Lb.	$15.63 a Gross Ton	$9.75 a Gross Ton
One week ago	2.114c.	15.79	9.83
One month ago	2.128c.	15.79	10.67
One year ago	2.214c.	17.58	13.33
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel		Pig Iron		Steel Scrap	
	High	Low	High	Low	High	Low
1931	2.142c., Jan. 13	2.114c., May 5	$15.90, Jan. 6	$15.63, May 26	$11.33, Jan. 6	$9.75, May 26
1930	2.362c., Jan. 7	2.121c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

TIN PLATE

Declining production is not so noticeable this week, although the operating rate of the leading interest dropped slightly under 70 per cent of capacity. Production of the principal independent companies is holding at recent levels and the average for the industry continues at approximately 70 per cent of theoretical full. The larger container manufacturers are taking shipments at a good rate and crop reports are not unfavorable.

STRIP STEEL

One maker has instructed its district offices to quote 1.55c. and 1.65c., Pittsburgh, on hot-rolled strip and 2.15c. to 2.25c. on cold-rolled on all third quarter business. Consumers, however, are showing little interest in their requirements for that period. One or two fair-sized inquiries have come from the automobile industry, but immediate action is not expected. New business is exceptionally light and is bringing out sharp price concessions in some territories on both hot-rolled and cold-rolled material. Releases are in such small volume that some of the smaller producers are operating some of their mills every other week, and if it is necessary to start up, two or three turns are usually sufficient to meet shipping needs.

COKE

Sellers of foundry coke have enjoyed somewhat heavier orders in the last week, reflecting in a measure the retirement from business of one large producer. No permanent increase in foundry consumption is apparent. Prices range from $3.25 to $3.50 on the ordinary grades to $4.85 on premium material. Furnace coke is very quiet. In the Pittsburgh territory, prices lower than $2.40 and $2.50, Connellsville, are exceptional, but large concessions are being offered in the East by producers not operating directly in the Connellsville region.

WAREHOUSE BUSINESS

Local warehouses have announced important changes in cutting charges and quantity differentials, effective May 25. Hereafter the base price on heavy hot-rolled products, bands and blue annealed sheets will apply on orders of 400 lb. and up to 999 lb., as compared with a previous maximum of 3999 lb. Cutting charges on the same products have been placed on a piece basis instead of on a tonnage basis as heretofore. A minimum charge of 35c. has been established and individual charges of from 1.50c. to 11c. will be applied. Prices on a number of warehouse items have also been revised downward. Bars are now quoted at 2.60c., warehouse, but plates and shapes are unchanged at 2.85c. Sheets are considerably lower and nails are off 10c. a keg, now being quoted at $2.05.

OLD MATERIAL

In the absence of important buying, the scrap market in this district has continued to weaken, and the average price for No. 1 heavy melting steel is not above $11. Several dealers are willing to sell small tonnages at this figure, and, while the last recorded sale was at $11.50 about two weeks ago, dealers have since been able to pick up small tonnages at as low as $10.50. Hydraulic compressed sheets are also weaker, the last reported sale having been made at $11. The blast furnace grades are holding fairly well in view of the fact that a permanent outlet for this material seems to have been established by one large consumer which had not heretofore been a user. Blast furnace scrap is not easy to buy, although dealers are fairly well covered on recent orders. Low scrap prices in this, as well as in outside districts ordinarily shipping to Pittsburgh, are beginning to be reflected in a tendency to freeze material which might otherwise be prepared for sale. This indicates that the market is beginning to reach minimum levels. The current list of the Baltimore & Ohio Railroad contains about 9000 tons of scrap, including 4000 tons of heavy melting steel.

Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.35c.
Squares and flats	3.85c.
Bands	2.95c.
Hoops	3.95c.
Black sheets (No. 24), 25 or more bundles	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.40c.
Light plates, blue annealed (No. 10)	2.75c. to 3.00c.
Blue annealed sheets (No. 13)	2.90c. to 3.00c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	3.74c.
Spikes, large	2.65c.
Small	2.90c. to 3.05c.
Boat	3.15c.
Track bolts, all sizes, per 100 count,	60 and 10 per cent off list
Machine bolts, 100 count,	60 and 10 per cent off list
Carriage bolts, 100 count,	60 and 10 per cent off list
Nuts, all styles, 100 count,	60 and 10 per cent off list
Large rivets, base per 100 lb.	$3.20
Wire, black, soft ann'l'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb.	2.75
Common wire nails, per keg	2.05
Cement coated nails, per keg	2.05

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 999 lb.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$10.50 to $11.00
No. 2 heavy melting steel	9.50 to 10.00
Scrap rails	10.75 to 11.25
Compressed sheet steel	10.50 to 11.00
Bundled sheets, sides and ends	8.50 to 9.00
Cast iron carwheels	11.50 to 12.00
Sheet bar crops, ordinary	11.50 to 12.00
Heavy breakable cast	8.50 to 9.50
No. 2 railroad wrought	11.00 to 11.50
Hvy. steel axle turnings	9.25 to 9.75
Machine shop turnings	6.50 to 7.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	13.50 to 14.00
Railr. coil and leaf springs	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
Low phos. billet and bloom ends	14.50 to 15.00
Low phos. mill plates	12.50 to 13.00
Low phos. light grades	12.50 to 13.00
Low phos. sheet bar crops	13.50 to 14.00
Heavy steel axle turnings	9.25 to 9.75
Electric Furnace Grades:	
Low phos. punchings	14.00 to 14.50
Heavy steel axle turnings	9.25 to 9.75
Blast Furnace Grades:	
Short shoveling steel turnings	7.25 to 7.75
Short mixed borings and turnings	7.25 to 7.75
Cast iron borings	7.25 to 7.75
Rolling Mill Grades:	
Steel car axles	16.50 to 17.50
Cupola Grades:	
No. 1 cast	10.50 to 11.00
Rails 3 ft. and under	13.00 to 13.50

CHICAGO

Ingot Output Slightly Lower as Steel Business Shrinks

▲ ▲ ▲

Ingot operating rate for district now about 46 per cent.

* * *

Pig iron shipments in May will not equal those of April.

* * *

Improvement in steel consumption for some users offset by declines elsewhere.

* * *

Scrap prices believed to have reached bottom. Advance occurs in cast iron carwheels.

▼ ▼ ▼

CHICAGO, May 26.—Ingot output has shrunk to about 46 per cent of capacity for the district as a whole, and there is no doubt now that May pig iron shipments will not be a match for the movement in April. Consumption of both finished steel and pig iron at most automobile centers is on a smaller scale, while on the other hand a few of the farm implement manufacturing departments and several of the smaller builders are making more liberal use of steel mill products. This situation is found among manufacturers of special equipment which will soon be needed in the fields, pea harvesters being one example.

Specifications to mills are a shade more than ample to support current output, while new sales have gained, but this is not of great consequence, for the reason that the market is highly variable and the general scale of activity is low enough so that at times a single order can make a week's business turn above the average.

Two orders for tank plates total 1200 tons. The battle for proration in east Texas is still on, and the tonnage needed in that direction is in doubt. In recent days there has been a better spread of plate tonnage for pipe manufacture. This is particularly helpful at this time when rail releases are scant and output is on the down grade, with seemingly little chance that secondary buying will bolster the market.

Contrary to the general drift of the market, one bar mill unit has added an open-hearth furnace and is now producing at about 55 per cent of capacity.

Tendencies in the scrap market are mixed, though in the long run dealers seem to be justified in believing that at least several important grades are oversold and that additional orders at current prices incur undue risk.

PIG IRON

The closing days of May are bringing further recession in the use of Northern foundry iron, and there is no longer hope that May shipments will equal the total of April. Only three merchant stacks are lighted, and these are not being pressed for tonnage, particularly in view of the fact that producers' yards are well filled. Quotations on Northern iron are steady at $17.50 a ton, local furnace. Southern iron is moving at $11 a ton, Birmingham. Few consumers are interested in commitments for the future, although they at times inquire for rather large tonnages as an entering wedge for the discussion of lower prices. Actual purchases are quite frequently less than one-third of the tonnages originally put before sellers. Two small spot orders for silvery have recently been booked.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	$25.04 to 27.04
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, copper free	28.50 to 29.20
Silvery, sil. 8 per cent	24.79 to 26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

FERROALLOYS

Consumption of these commodities is slowly shrinking as steel mill output moves downward. Ferromanganese is priced at $85 a ton, seaboard, in car lots, with revisions downward in prices for larger lots.

SHEETS

Output in this district is still close to 45 per cent of capacity. New buying is at close range. Shipments to jobbers are turning downward.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.40c. to 2.50c.; No. 24 galv., 2.95c. to 3.05c.; No. 10 blue ann'l'd, 2.00c. to 2.10c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

HOT-ROLLED STRIP

The second half of May started with slightly heavier rolling schedules, but in recent days shipments have slipped back, which may or may not prove a true indicator of the drift of the market. Reports are persistent that some of the automobile manufacturing plants are slowing down, and it is natural to assume that the use of hot strips will also decline. Miscellaneous users continue to take this commodity in fairly steady aggregate volume.

COLD-ROLLED STRIP

Output remains in the range from 30 to 35 per cent of capacity, with new demand more irregular than earlier in the month. The common quotation in this district is 2.15c. a lb., Cleveland, or 2.43c., delivered Chicago.

WAREHOUSE BUSINESS

Demand has not held to the peak of the second week of May, which was the best week so far this year. In fact, shipments from warehouses have fallen back to the level of the end of April.

WIRE PRODUCTS

Demand from the manufacturing trade shows little change except at some automobile manufacturing centers, where consumption is lighter. Jobbers are experiencing a falling off in sales earlier than usual, a recession in demand being generally expected in June. Output at wire mills has dropped several points to an average that is somewhat under 40 per cent of capacity. Here and there a jobber is found with a fair stock on hand, but generally jobbers are willing to make full use of prompt mill service, which is made possible by well rounded stocks. The spring months of 1931 have witnessed a heavier demand for nails than was experienced in the corresponding period last year. However, the use of this commodity is far below what producers have set as normal. The movement of mesh for concrete pavement work continues to grow. Weather conditions are generally favorable to the farmer, although in some sections of the country temperatures have been too low for proper development of warm weather crops.

CAST IRON PIPE

Private buying of cast iron pipe is less active, and municipalities are not lending the support to the market that usually can be counted on at this time of year. Prices are variable. Quotations on carloads of 6-in. and larger diameters are fairly stable at $35 to $36 a ton, Birmingham, whereas prices for larger tonnages often drop $3 to $4 a ton. The general average of foundry output is close to 60 per cent

of capacity. It is reported that Chicago will distribute about 5000 tons of 30 to 48-in. pipe before the end of the month. Detroit has taken bids on 1900 tons of 12-in. pipe. James B. Clow & Sons are low on 750 tons of 30 and 36-in. pipe at Racine, Wis. Fox Point, Wis., will open bids June 4 on 1150 tons of 6 to 12-in. Class C pipe and 75 hydrants.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $43 to $44; 4-in., $46 to $47; Class A and gas pipe, $3 extra.

RAILS AND TRACK SUPPLIES

Standard-section rail schedules continue in a downward course, with output not above a range of 35 to 40 per cent of capacity. New releases of rails are light, but specifications for track supplies are well up to the average of recent weeks. The development of a secondary buying movement in rails seems to be remote. Tonnages carried over from last year's contracts now look rather impressive in view of railroad earnings.

REINFORCING BARS

Inquiries have suddenly turned upward. Perhaps no great significance can be attached to this, as the market has been rather erratic for a month or more. It is important, however, that among new requests for prices is a more liberal tonnage for buildings.

Road programs continue to take the largest part of reinforcing bar shipments and the prospects are that this situation will continue for some time.

The price structure remains on an unstable footing. Billet steel reinforcing bars are being quoted 1.65c. a lb., Chicago warehouse, for bridges in Wisconsin. Competition by bar producers from east of Chicago is becoming an increasing market factor to the north and west of Chicago.

BOLTS, NUTS AND RIVETS

Use of these commodities by the automobile industry is smaller, but miscellaneous consumers are showing very little variation in their needs. Shipments to jobbers are steady.

STRUCTURAL MATERIAL

Awards have again turned upward, the total being over 9000 tons. Fresh inquiries total 7000 tons. Of special interest is a request for prices on 2000 tons for a building for the Western Electric Co. Bids have been entered on 4000 tons for the Post Office at Kansas City, Mo.

BARS

The recent increase in the use of bars apparently has been checked. It is difficult to gage the market. The tonnage a short time ago showed great diversification as to users, but in recent days releases seem to have been confined to comparatively few users. Alloy bar mills are producing at about 45 per cent of capacity, while iron bar mills are far below this figure. Specifications for rail steel bars are holding fairly steady, but new buying, influenced largely by the bed trade, has dropped off rather sharply.

PLATES

The local plate market is very quiet except in specifications for line pipe manufacture. Little is now being heard concerning the outlook for oil storage tank work. The East Texas oil field seems to have been dropped from the calculations of tank fabricators and sellers of steel. There does not seem to be a single new turn in the railroad equipment market, though reports have been in circulation for several days that some railroads are seeking sources for financing new equipment programs.

COKE

Shipments of by-product foundry coke are pointing downward in line with the curtailed movement of foundry pig iron. Quotations are steady at $7.50 a ton, local ovens.

OLD MATERIAL

The feeling is broadening among dealers in scrap iron and steel that the bottom of prices has been reached. They believe that the market has been oversold and they also recognize that at present levels consumers will be forced to subsist on the tonnages that can be made available within a very close radius of Chicago. In a normal market about 30 per cent of the scrap used locally is shipped in from outside of Chicago, whereas at present it is doubtful if more than 5 per cent of the scrap being consumed is being shipped in. Industrial activity in Chicago is at a comparatively low level, and scrap yard operations are not attractive at the small margin of profit to be had. Railroads are dissatisfied with the prices bid and not only are their lists small, but they quite frequently sell only such scrap as they have available for immediate shipment. In the meantime, mills are letting down on restrictions in an endeavor to keep scrap flowing more uniformly. Cast iron car wheels are up 75c. as dealers bid higher to get tonnages for which they are being pressed by consumers.

Prices deliv'd Chicago district consumers:

	Per Gross Ton	
Basic Open-Hearth Grades:		
Heavy melting steel	$8.50 to	$9.00
Shoveling steel	8.50 to	9.00
Frogs, switches and guards, cut apart, and misc. rails	8.50 to	9.00
Factory hyd. comp. sheets	7.00 to	7.50
Drop forge flashings	6.00 to	6.50
No. 1 busheling	6.75 to	7.25
Forg'd cast and r'l'd steel carwheels	11.00 to	11.50
Railroad tires, charg. box size	11.50 to	12.00
Railroad leaf springs cut apart	11.50 to	12.00
Axle turnings	7.00 to	7.50
Acid Open-Hearth Grades:		
Steel couplers and knuckles	9.75 to	10.25
Coil springs	11.50 to	12.00
Electric Furnace Grades:		
Axle turnings	7.50 to	8.00
Low phos. punchings	10.75 to	11.25
Low phos. plates, 12 in. and under	10.50 to	11.00
Blast Furnace Grades:		
Cast iron borings	3.75 to	4.00
Short shoveling turnings	3.50 to	4.00
Machine shop turnings	3.50 to	4.00
Rolling Mill Grades:		
Rerolling rails	10.50 to	11.00
Cupola Grades:		
Steel rails, less than 3 ft.	10.75 to	11.25
Steel rails, less than 2 ft.	11.75 to	12.25
Angle bars, steel	10.00 to	10.50
Cast iron carwheels	9.50 to	10.00
Malleable Grades:		
Railroad	10.25 to	10.75
Agricultural	9.75 to	10.00
Miscellaneous:		
*Relaying rails, 56 to 60 lb.	19.00 to	21.00
*Relaying rails, 65 lb. and heavier	22.00 to	27.00
	Per Net Ton	
Rolling Mill Grades:		
Iron angle and splice bars	9.50 to	10.00
Iron arch bars and transoms	10.50 to	11.00
Iron car axles	17.50 to	18.50
Steel car axles	11.50 to	12.00
No. 1 railroad wrought	7.50 to	8.00
No. 2 railroad wrought	7.50 to	8.00
No. 1 busheling	6.00 to	6.50
No. 2 busheling	4.00 to	4.50
Locomotive tires, smooth	11.50 to	12.50
Pipes and flues	5.50 to	6.00
Cupola Grades:		
No. 1 machinery cast	9.00 to	9.50
No. 1 railroad cast	8.00 to	8.50
No. 1 agricultural cast	7.00 to	7.50
Stove plate	6.25 to	6.75
Grate bars	6.00 to	6.50
Brake shoes	6.00 to	6.50

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.90c.
Reinforcing bars, billet steel	1.65c. to 2.00c.
Rail steel reinforcement—	
For buildings	1.45c. to 1.65c.
Highway slabs	1.65c.
For bridges and culverts	1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.35c.
Flats and squares	3.85c.
Bands, ¾ in. (in Nos. 10 and 12 gages)	3.10c.
Hoops (No. 14 gage and lighter)	3.65c.
Black sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes (⅝ in. and larger)	3.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60 and 10
Carriage bolts	60 and 10
Coach and lag screws	60 and 10
Hot-pressed nuts, sq., tap. or blank,	60 and 10
Hot-pressed nuts, hex., tap. or blank,	60 and 10
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.50
Cement c't'd nails, base per keg	2.30

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Iron and Steel Exports Decline, Imports Rise

WASHINGTON, May 26.—Exports of iron and steel from the United States in April were 101,081 tons, a decline of 8431 tons from March. Shipments to Canada were 53,281 tons. Imports rose 7471 tons to 47,872 tons. Pig iron receipts were 14,479 tons. Imports from Belgium totaled 13,443 tons.

CLEVELAND

Steel Orders From Automobile Industry Have Decreased

CLEVELAND, May 26.—There was little change in the demand for finished steel the past week, although the volume of business still shows a downward tendency. Business has decreased from the motor car industry, as some of the manufacturers in that field will reduce operations in June. Tonnage entered by local sales offices this month will show a little decline from that of April.

Cleveland steel plants are maintaining their recent operations of 19 of 34 open-hearth furnaces, or 56 per cent of ingot capacity.

Reports from independent mills manufacturing flat rolled material indicate some reduction this week in production of full finished sheets and hot and cold-rolled strip. Recent production of black sheets is being maintained.

While some of the stamping plants are not so busy as recently, other metal-working plants in this territory generally are maintaining recent operations. Inquiry from railroads for miscellaneous requirements is very light. While not much commercial building work is coming out, a good demand for structural steel is expected a little later for railroad bridge and grade elimination work and for public buildings.

PIG IRON

The market continues very dull. Sales are limited to small lots for early needs. Some consumers who have cleaned up shipments on old contracts are not making new commitments, preferring to follow a hand-to-mouth policy in buying. While shipments in May will be fully as good as those in April, some falling off is expected in June, as three of the motor car companies have reduced their shipping orders. Prices are steady without enough business to test the market. Foundry and malleable iron are quoted at $16 to $17, Lake furnace, for Ohio and Indiana shipment, and $17 to $17.50 for Michigan. Furnaces in Cleveland quote $17 for local delivery.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$17.00
S'th'n fdy., sil. 1.75 to 2.25	17.01
Malleable	17.50
Ohio silvery, 8 per cent	25.00
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; $3 from Jackson, Ohio; $6.01 from Birmingham.

BARS, PLATES AND SHAPES

Demand for steel bars shows a downward tendency, due largely to decrease in the demand from the motor car industry. Consumers are restricting their orders to small lots for current needs. New inquiry for reinforcing bars is light. Bids for the Columbus Road bridge, Cleveland, requiring 350 tons, have been rejected and the job will be readvertised. There is little life in the plate market. While shipments of structural shapes are fair, little new inquiry for building work came out during the week. Prices are steady at 1.65c., Cleveland, for steel bars for outside shipment and at 1.70c. for local delivery and at 1.65c., Pittsburgh, for plates and shapes.

SHEETS

Demand declined slightly the past week. Specifications from the motor car industry are not coming out in quite as good volume as recently. Some of the Ohio stamping plants serving that industry have slowed down operations. Demand from electric refrigerator makers is being maintained. Business is light from makers of stoves, metal partitions and steel barrels. Most mills have established the new classifications, which they will apply to third quarter business. The Fisher Body Corpn. has discontinued buying sheets in Cleveland for its local plant, having centralized purchases in Detroit. Prices show virtually no change. While most mills are going to 2.15c., Pittsburgh, for black sheets, some are adhering to 2.25c. and getting business at that price. Auto body sheets appear to be fairly well maintained at 3.10c.

SEMI-FINISHED STEEL

Consumers are ordering small lots as needed. Prices range from $29 to $30, Cleveland and Youngstown, for sheet bars, billets and slabs.

WIRE PRODUCTS

Manufacturers' wire is moving fairly well to bolt and nut makers and fencing is in good demand. Nails show a slight falling off. Local mills are maintaining recent operations. While there is a spread of 2.20c. to 2.30c., Cleveland, on manufacturers' wire, most business is going at the lower price.

BOLTS, NUTS AND RIVETS

Demand for bolts and nuts this month is falling slightly below the April volume. The industry is operating at 40 to 45 per cent of capacity. Rivet orders are light, showing little change from month to month. While the Pennsylvania electrification work will require a good tonnage, probably only about 200 tons will be placed in the market, the remainder being supplied by fabricating plants that make their own rivets. Prices are well maintained.

STRIP STEEL

Demand for hot-rolled strip is not holding up to recent volume. Orders from some of the manufacturers of automobile accessories show a decline. While some mills are making an effort to get 1.55c., Pittsburgh, for wide strip and 1.65c. for narrow for current orders they are meeting with little, if any, success, as small orders are going at $1 a ton lower, and it seems doubtful if the attempt to get the higher prices for the third quarter will succeed. Cold-rolled strip is very dull. For current orders, 2.15c., Cleveland, is quite generally quoted, but some mills are asking 2.25c. for the third quarter.

OLD MATERIAL

No new buying by mills is reported. Activity during the week was confined to small-lot purchases by dealers for delivery to Valley district mills. Locally, one consumer continues to take small quantities of blast furnace and steel-making scrap. Prices are weak, but unchanged.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	$9.50 to	$9.75
No. 2 heavy melting steel	9.00 to	9.50
Compressed sheet steel	8.25 to	8.75
Light bundled sheet stampings	7.00 to	7.50
Drop forge flashings	7.00 to	7.25
Machine-shop turnings		5.50
Short shoveling turnings	6.25 to	6.75
No. 1 railroad wrought	9.50 to	10.00
No. 2 railroad wrought	10.00 to	10.50
No. 1 busheling	7.50 to	8.00
Pipes and flues	5.50 to	6.00
Steel axle turnings	7.50 to	8.00
Acid Open-Hearth Grades:		
Low phos., billet bloom and slab crops	14.00 to	14.50
Blast Furnace Grades:		
Cast iron borings	6.25 to	6.75
Mixed borings and short turnings	6.25 to	6.75
No. 2 busheling	6.00 to	6.25
Cupola Grades:		
No. 1 cast	10.00 to	10.50
Railroad grate bars	6.00 to	6.50
Stove plate	6.00 to	6.50
Rails under 3 ft	15.00 to	15.50
Miscellaneous:		
Rails for rolling	13.00 to	13.50
Railroad malleable	11.00 to	11.25

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex	3.40c.
Cold-fin. flats and sq	3.90c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.60c.
Galvanized sheets (No. 24)	4.00c.
Blue ann'l'd sheets (No. 10)	3.00c.
No. 9 ann'l'd wire, per 100 lb	$2.35
No. 9 galv. wire, per 100 lb	2.80
Com. wire nails, base per keg	2.25

*Net base, including boxing and cutting to length.

NEW YORK Steel Orders in May Below April Volume —Pig Iron Demand Light

NEW YORK, May 25.—Pig iron demand has shown some improvement in New England, but is still exceedingly light in this vicinity. The Eastern Malleable Iron Co., Naugatuck, Conn., is in the market for 1000 tons of malleable, while the H. B. Smith Co., Westfield, Mass., has closed for 1500 tons of iron and the Whitin Machine Works, Whitinsville, Mass., has placed 1000 tons. Sales in this territory during the week aggregate only about 3500 tons, compared with 3000 tons in the previous week and 4000 tons two weeks ago.

Foundry operations in this district probably do not average more than 30 per cent of normal and, with castings business exceedingly light, there is little incentive to buy except in very small lots. There have been no new tests of prices. The northern New York furnace and the New England stack, both of which can ship by water, are active sellers, but Buffalo, eastern Pennsylvania and Alabama furnaces remain factors in the market.

The Standish, N. Y., maker of low phosphorus iron blew out its furnace for repairs early in the month.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$19.91 to $20.41
*Buff. No. 2, del'd east. N. J.	18.28 to 18.78
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	17.39 to 17.89
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	17.89 to 18.39

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.
*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

FINISHED STEEL

With the end of the month only a few days away, it is apparent that May orders for steel in this district will fall below those of April. Except perhaps in structural steel, in which there is an increasing number of small orders and inquiries, the outlook for the coming month is not promising. Although counting on the possibility that a turn for the better may come when least expected, local steel sellers cannot at the moment point to any development that is likely to bring such a change, unless the discussions at last week's meeting of the American Iron and Steel Institute should result in a firmer attitude on prices. A strengthening in the price of black sheets is considered to be an early possibility, some mills now standing firm for a minimum of 2.25c. a lb., Pittsburgh. Although no large amount of business was done in this district in recent weeks at less than 2.25c., occasional sales of desirable lots were made at 2.15c. and 2.20c. Under the new sheet steel classification, which is expected to become fully effective on third quarter contracts, black sheets will take a base price of 2.40c., Pittsburgh, and will be known as hot-rolled annealed sheets.

WAREHOUSE BUSINESS

Buying from warehouses continues light, with slight improvement in demand for small lots. Prices of structural material and sheets remain unchanged, absence of large orders precluding any concessions.

REINFORCING BARS

Prices have improved slightly so that 1.65c., Pittsburgh, or 1.98c., New York, applies on small contracts and 1.60c., Pittsburgh, or 1.93c., New York, on the larger projects. Recent concessions to lower levels were the result of barge shipments of reinforcing bars from Buffalo on considerably lower rates than the all-rail freight from Pittsburgh. Some substantial projects have been awarded, including 1000 tons of bars for anchorages on the Tri-borough bridge and 400 tons of wire mesh, placed by the Board of Transportation for elevated structure fireproofing in Brooklyn.

CAST IRON PIPE

Orders for small lots of water pipe continue fairly active, but larger contracts are limited in number. Contractors are inquiring for 15,000 ft. of 18-in. water pipe, with alternate prices requested on 16-in., for a crossing under the Monocacy River, near Frederick, Md. Contractors have also been asking for prices on small lots of pipe for installations in Westchester County. Prices quoted on recent projects show no change, although Northern producers have only a small backlog of tonnage on their books.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $33.90 to $35.90; 4-in. and 5-in., $36.90 to $38.90; 3-in., $42.90 to $45.90. Class A and gas pipe, $3 extra.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue ann'l'd sheets (No. 10)	3.00c. to 3.25c.
Black sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10

Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

OLD MATERIAL

Many grades of scrap are reaching levels where price ceases to be a factor in transactions. Machine shop turnings are being bought in this district at $2 a ton for shipment to eastern Pennsylvania, and as little as $1.70 a ton has been paid. The consumers of No. 1 heavy melting steel at Coatesville, Pa., and Claymont, Del., are not accepting deliveries at present, so that the only market is for barge shipment to Buffalo at $6.50 a ton, on barge, New York. Other grades of scrap are inactive, and in certain instances cannot be sold at any price, such as No. 1 blast furnace scrap, for which there is no market at present. In the New England district small lots of turnings have been given away by holders to anyone who would remove them.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$5.50 to	$6.50
Heavy melting steel (yard)	4.00 to	4.50
No. 1 hvy. breakable cast	6.50 to	7.00
Stove plate (steel works)	4.25 to	4.50
Locomotive grate bars	4.25 to	4.50
Machine shop turnings		2.00
Short shoveling turnings		2.00
Cast borings (blast fur. or steel works)		2.25
Mixed borings and turnings	1.75 to	2.00
Steel car axles	12.50 to	13.00
Iron car axles	16.50 to	17.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)		6.25
Forge fire	5.00 to	5.50
No. 1 railroad wrought		8.75
No. 1 yard wrought, long		7.75
Rails for rolling	7.50 to	8.00
Stove plate (foundry)		4.50
Malleable cast (railroad)	8.50 to	9.00
Cast borings (chemical)	8.00 to	8.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$12.00 to	$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.; cupola size)	10.00 to	10.50
No. 2 cast (radiators, cast boilers, etc.)	9.50 to	10.00

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Total sales of metal doors, shutters and window sash and frames in 1929 by 148 manufacturing plants amounted to $69,242,000, of which $58,864,000, or 85 per cent, represented sales made direct to industrial users, such as building contractors, etc., according to the Bureau of the Census.

PHILADELPHIA

Steel Operating Rates Slightly Downward—Scrap Still Weak

PHILADELPHIA, May 26. Reflecting the declining demand for steel, the operating rates of eastern Pennsylvania mills are slightly downward. The rates are variable, ranging from 35 per cent for one or two companies to 43 per cent for the leading independent. Buying of steel is in small lots for prompt shipment in most instances.

Some plate fabricating projects are in prospect, including tank work for an eastern Pennsylvania oil company and a submarine for the Navy Department. The latter will require about 500 tons of plates and 150 tons of shapes. The low bidder for the complete submarine was the Electric Boat Co., New York.

PIG IRON

Recent transactions in foundry iron have been at $16.50 a ton, furnace. While this price is the minimum quotation on No. 2 plain, the silicon differential for 2X and 1X has been reduced in certain instances by 25c. a ton. Southern foundry iron is still quoted at $11 a ton, Birmingham. The Pennsylvania Railroad is inquiring for 100 tons of high manganese foundry iron for its Altoona, Pa., shops. On 100 tons of low phosphorus iron, inquired for by the Panama Canal Commission, Washington, a low bid of $29.95, delivered Canal Zone, was submitted by an importer of British iron, and $32.69, delivered, was the lowest bid by an American maker. Business in basic iron continues inactive except for continued deliveries of medium-sized tonnages of Indian iron to an eastern Pennsylvania steel company.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$17.26 to $17.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	17.76 to 18.26
East. Pa. No. 1X	18.26 to 18.76
Basic (del'd east. Pa.)	17.00 to 17.25
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

STEEL BARS

The quotation is unchanged at 1.65c., Pittsburgh, or 1.94c., delivered Philadelphia for small lots of bars, with occasional concessions of $1 a ton to 1.60c., Pittsburgh, or 1.89c., Philadelphia, on orders for a carload or more. Billet steel reinforcing bars are quoted at 1.60c. to 1.65c., Pittsburgh, or 1.89c. to 1.94c., Philadelphia, for ordinary tonnages, and concessions of $1 a ton and more on the larger projects. Rail steel bars are quoted at 1.20c. to 1.30c., Pittsburgh, or 1.49c. to 1.59c., Philadelphia. An administration building for the Lower Merion high school, Merion, Pa., calls for 200 tons of bars.

SHAPES

Most mills are quoting 1.75c., f.o.b. nearest mill to consumer, or 1.81c., Philadelphia, with occasional concessions of $1 a ton on the larger and more desirable tonnages. An administration building for the Lower Merion high school calls for 400 tons of shapes and a gymnasium for Villanova College, Villanova, Pa., will require 500 tons.

PLATES

Mills in this district are quoting 1.75c., Coatesville, Pa., or 1.85½c., Philadelphia, with occasional concessions of $1 a ton to 1.70c., Coatesville, or 1.80½c., Philadelphia, on sizable business

SHEETS

Galvanized sheets are quoted at 2.75c. to 2.80c. a lb., Pittsburgh, or 3.04c. to 3.09c., Philadelphia, and concessions of $1 a ton are occasionally granted on more than a carload. Black sheets are 2.25c., Pittsburgh, or 2.54c., Philadelphia, with occasional concessions granted. Blue annealed sheets, No. 13 gage, are 2c., Pittsburgh, or 2.29c., Philadelphia, and blue annealed plates, No. 10 gage, are 1.85c., Pittsburgh, or 2.14c., Philadelphia.

IMPORTS

In the week ended May 23, 6750 tons of iron ore arrived at this port from Algeria, and 107 tons of pig iron was received from the Netherlands. Steel arrivals consisted of 60 tons of structural shapes from Belgium and 55 tons from Germany, six tons of steel strips from the United Kingdom and 41 tons of steel bars from Germany.

OLD MATERIAL

All grades show a continued downward price trend, with consuming markets limited. A Phoenixville, Pa., consumer has reduced its offering prices to $5, delivered, for machine shop turnings of local origin, and $6, delivered, for turnings shipped from New England, and is paying $7, delivered, for No. 2 steel. Users of No. 1 heavy melting steel are postponing deliveries.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$9.00 to $10.00
No. 2 heavy melting steel	7.00 to 7.50
Heavy melting steel (yard)	6.50 to 7.00
No. 1 railroad wrought	11.00 to 11.50
Bundled sheets (for steel works)	6.50
Hydraulic compressed, new	7.50 to 8.50
Hydraulic compressed, old	6.50 to 7.00
Machine shop turnings (for steel works)	5.00 to 6.00
Heavy axle turnings (or equiv.)	8.00 to 8.50
Cast borings (for steel works and roll. mill)	5.00 to 6.00
Heavy breakable cast (for steel works)	10.50
Railroad grate bars	8.00 to 8.50
Stove plate (for steel works)	8.00 to 8.50
No. 1 low phos., hvy. (0.04% and under)	15.00 to 15.50
Couplers and knuckles	13.00 to 13.50
Rolled steel wheels	13.00 to 13.50
No. 1 blast f'nace (nom.)	4.50
Wrot. iron and soft steel pipes and tubes (new specific.)	11.00 to 11.50
Shafting	16.50 to 17.00
Steel axles	16.50 to 17.00
No. 1 forge fire	8.50 to 9.00
Cast iron carwheels	12.00 to 12.50
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	13.00 to 14.00
Steel rails for rolling	12.00 to 13.00

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Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¾-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.50c.
†Galvanized sheets (No. 24)	3.95c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'l'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 40 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Steel Barrel Plants Employed at 32 Per Cent

April employment of plants of the members of the Steel Barrel Manufacturers' Institute was an average of 31.9 per cent of capacity. Productive capacity for I. C. C. barrels was employed at 14.5 per cent; while that for light barrels was used at 36.8 per cent.

Shipments during April aggregated 346,907 units, leaving unfilled orders on May 1 at 514,596 barrels. Business for the month is reported at $785,733.

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United States Large User of Soviet Iron Ore

In view of the recent report that the U. S. S. R. is expected to have 2,000,000 to 2,250,000 tons of iron ore available for export annually, it is noteworthy that, according to the Department of Commerce, Russia exported 466,619 metric tons in 1930, compared with 545,204 tons in 1929. Of the 1930 exports, 220,853 tons went to Czechoslovakia, and the United States was the second largest user, taking 98,033 tons. Poland received 85,584 tons, Germany 23,719 tons, France 10,516 tons, and all other countries took 27,914 tons.

BOSTON

Reinforcing Steel Lettings Larger—Pig Iron and Scrap Movement Small

BOSTON, May 26.—A Massachusetts melter bought 1000 tons of No. 2 plain—200 tons from a Buffalo stack, 300 tons from an Alabama and 500 tons from the Mystic Iron Works—and another Massachusetts consumer bought 300 tons of No. 1X from the Everett furnace. Business otherwise was in small tonnages the past week, with the total about 2000 tons. The average price paid for the 1000-ton purchase was less than $18.50 a ton, delivered. One furnace is negotiating privately with a melter for 1000 tons, but there is no other prospective business. The New England melt last week was a shade higher, but the foundry industry is still operating at less than 30 per cent of capacity.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	$19.91 to $20.91
*Buffalo, sil. 2.25 to 2.75	19.91 to 20.91
†Buffalo, sil. 1.75 to 2.25	19.28 to 20.28
†Buffalo, sil. 2.25 to 2.75	19.28 to 20.28
*Ala., sil. 1.75 to 2.25	20.11 to 20.61
*Ala., sil. 2.25 to 2.75	20.61 to 21.11
†Ala., sil. 1.75 to 2.25	16.75
†Ala., sil. 2.25 to 2.75	17.25

Freight rates: $4.91 all rail from Buffalo; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

REINFORCING STEEL

During the week sales of reinforcing bars totaled about 2600 tons. The largest sale was 900 tons of rail steel bars for the Boston Post Office by the Northern Steel Co. That company also sold 350 tons of bars for a Boston Consolidated Gas Co. warehouse at Jamaica Plain, Boston. Most of the other lettings were billet steel bars. Prices from stock for billet bars are: 1 to 5-ton lots, 3c. a lb., base; 6 to 99-ton lots, 2.40c.; 100-ton lots and larger, 2.30c. Rail steel bars are 2.26½c. a lb., delivered Boston rate points.

FABRICATED STEEL

Lettings for the week were 1600 tons, against 2250 tons the previous week. New prospects total about 2000 tons. The largest award the past week was 800 tons for a State bridge at Greenfield, Mass. T. J. McHugh, Watertown, Mass., will furnish and lay 8400 ft. of 60-in. welded pipe between Newton and Watertown. The largest new prospect calls for 980 tons of steel and 21 tons of machinery for a State bridge at Wiscasset, Me.

OLD MATERIAL

Business is in small volume and prices are unsettled. Some breakable cast at $6 a ton, on cars shipping point, mixed borings and turnings at $1.25, and stove plate at $3.50 are being taken for Pennsylvania delivery. Mixed borings and turnings, stove plate, long bundled skeleton and No. 1 heavy melting steel are being sold for New England consumption, the heavy melting steel usually at $5.35 a ton, on cars shipping point, and skeleton at $1 less. Yard stocks of scrap are reported as the smallest in many years.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$5.00 to $5.35
Scrap T rails	5.00 to 5.25
Scrap girder rails	4.00 to 4.25
No. 1 railroad wrought	7.00 to 7.50
Machine shop turnings	1.50 to 1.75
Cast iron borings (steel works and rolling mill)	1.50 to 1.75
Bundled skeleton, long	4.35 to 4.50
Forge flashings	5.00 to 5.25
Blast furnace borings and turnings	1.25 to 1.50
Forge scrap	5.00 to 5.25
Shafting	10.00 to 10.50
Steel car axles	11.00 to 12.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	5.00 to 5.25
Rails for rolling	7.50 to 8.00
Cast iron borings, chemical	7.10 to 8.50
No. 2 cast	5.00 to 5.25
Prices per gross ton deliv'd consumers' yards:	
Textile cast	$9.00 to $10.00
No. 1 machinery cast	9.00 to 10.00
Stove plate	5.00 to 5.25
Railroad malleable	13.00 to 13.50

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.36½c.
Structural shapes—	
Angles and beams	3.36½c.
Tees	3.36½c.
Zees	3.36½c.
Soft steel bars, small shapes	3.26½c.
Reinforcing bars	3.11½c. to 3.26½c.
Iron bars—	
Refined	3.26½c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.80c.

	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts	60 and 5
Cold-punched nuts	60 and 5
Stove bolts	70 and 10

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BIRMINGHAM

Some Pig Iron Buying for June—Cast Iron Pipe Outlook Better

BIRMINGHAM, May 26.—There has been some forward buying of pig iron for June requirements, but this has not changed market conditions to an appreciable extent. Interest is sluggish, and orders continue to be irregular and mostly on a spot basis. May shipments of merchant producers have been off, and production during the month will be in excess of the outward movement. Quotations on district orders are still from $12 to $13. Thirteen furnaces are in blast. No changes have taken place in the past 10 days.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00 to $13.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50 to 13.50
Basic	12.00 to 13.00

CAST IRON PIPE

An improvement is reported in prospective tonnage, and it is thought that within the next two weeks some very good business will be booked. Inquiries last week were better than for some time. Current bookings, however, have gained but little, and plant operations continue around 50 per cent. Quotations remain at $35 to $36, base.

FINISHED STEEL

Inquiries for plates, structural shapes and bars improved last week, but actual new tonnage did not show much of a gain over that of the three or four preceding weeks. Quite a favorable tonnage is tied up in pending projects, but it is uncertain when this will be available. New business of the structural steel and reinforcing bar fabricators continues mostly in small orders. Ingalls Iron Works last week received an order for 110 tons of crest gates for the Cumberland River in Tennessee, placed by the United States Engineer office at Nashville. Active open-hearths number 13, the Tennessee company having 11 on and the Gulf State Steel Co. two. Operations have been the same for several weeks.

OLD MATERIAL

Mills are not taking very much on contracts, and other users are limiting their shipments. New business is light. Prices are nominal.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$9.50 to $10.00
Scrap steel rails	10.00
Short shoveling turnings	7.50
Cast iron borings	(No market)
Stove plate	7.50
Steel axles	15.00 to 16.00
Iron axles	18.00
No. 1 railroad wrought	8.00
Rails for rolling	11.50 to 12.00
No. 1 cast	10.00
Tramcar wheels	11.00 to 11.25
Cast iron borings, chem.	13.50
Cast iron carwheels	11.00

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Federal Trade Commission has dismissed a complaint charging the Wheeling Steel Corpn., Wheeling, W. Va., and five other Eastern manufacturers, with unfair methods of competition in the sale and distribution of range boilers on the Pacific Coast. Other companies listed as respondents are: John Wood Mfg. Co., Conshohocken, Pa.; Detroit Range Boiler & Steel Barrel Co., Detroit; W. A. Case & Son Mfg. Co., Buffalo; Casey-Hedges Co., Inc., Chattanooga, and Scaife Mfg. Co., Pittsburgh.

CINCINNATI

Pig Iron Sales Slightly Better Though Melt Is Not Gaining

CINCINNATI, May 26.—Despite low foundry melt in this district, demand for pig iron last week exceeded that of the preceding week by about 700 tons, total sales having been about 2400 tons, all for immediate needs. Pipe and automotive foundries are operating at a better rate than those handling machine tool castings. Quotations on pig iron in this district are marked by uncertainty of Northern prices and the reported adherence of Southern furnaces to the present quotation of $11, base Birmingham.

Prices per gross ton, deliv'd Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$14.69
Ala. fdy., sil. 2.25 to 2.75	15.19
Tenn. fdy., sil. 1.75 to 2.25	14.69
S'th'n Ohio silvery, 8 per cent	23.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

FINISHED STEEL

A slight decline in the demand for sheets is noted by district sheet mills. Orders are slightly under the 50 per cent level.

OLD MATERIAL

The district scrap market is without feature. Dealers are buying and selling warily, as prices show little stability. Bids are very low, but even at the present levels they have an undertone of softness. Mills are taking some scrap on old commitments, but new business is infrequent and small.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.35c.
Cold-fin. rounds and hex	3.80c.
Squares	4.30c.
Black sheets (No. 24)	3.90c.
Galv. sheets (No. 24)	4.40c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb	$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb	10.25
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$8.25 to	$8.75
Scrap rails for melting	10.25 to	10.75
Loose sheet clippings	4.50 to	5.00
Bundled sheets	7.75 to	8.25
Cast iron borings	4.75 to	5.25
Machine shop turnings	5.00 to	5.50
No. 1 busheling	6.75 to	7.25
No. 2 busheling	4.25 to	4.75
Rails for rolling	11.50 to	12.00
No. 1 locomotive tires	9.50 to	10.00
No. 2 railroad wrought	8.25 to	8.75
Short rails	13.00 to	13.50
Cast iron carwheels	10.50 to	11.00
No. 1 machinery cast	12.50 to	13.00
No. 1 railroad cast	11.50 to	12.00
Burnt cast	5.25 to	5.75
Stove plate	5.25 to	5.75
Brake shoes	5.25 to	5.75
Agricultural malleable	10.00 to	10.50
Railroad malleable	11.00 to	11.50

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PACIFIC COAST

Western Company Low Bidder on 35,000 Tons of Steel Pipe

SAN FRANCISCO, May 23.—The feature of the steel market on the Pacific Coast this week was the opening of bids on 35,000 tons of welded steel pipe for the Hetch Hetchy project, San Francisco, on which the Western Pipe & Steel Co. was low bidder for the pipe. In addition, several large structural awards were placed, and a slight increase in new inquiries was noted. On the whole, little or no change occurred in the price structure.

BARS

Demand for merchant and reinforcing steel bars is slow. Only two awards of over 100 tons were reported. Unnamed interests took 150 tons for a store for Kress & Co., Los Angeles, and 112 tons for a bridge over the Santa Ana River, Orange County, Cal. An award is expected within the next few days on 4000 tons for the Sixth Street viaduct, Los Angeles. Bids have been opened on 255 tons for the Hetch Hetchy pipe line, San Francisco, on 220 tons for paving in Sacramento County, Cal., and on 420 tons for the Sloat Boulevard viaduct in San Francisco. New inquiries include 240 tons for paving in Colusa County, Cal. No change is noted in out-of-stock prices in either the Los Angeles or San Francisco districts, prices in the former section being general at 2.50c., base, for carload lots and in the latter district they are firm at 2.60c.

Pig iron prices per gross ton at San Francisco:

*Utah basic	$22.00 to $24.00
*Utah fdy., sil. 2.75 to 3.25	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25	22.00 to 24.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	2.50c.
Soft steel bars	2.50c.
Black sheets (No. 24)	4.15c.
Blue ann'l'd sheets (No. 10)	3.05c.
Galv. sheets (No. 24)	4.65c.
Struc. rivets, ½-in. and larger	5.00c.
Com. wire nails, base per keg	$3.35
Cement c't'd nails, 100 lb. keg	3.35

PLATES

The Youdall Construction Co., San Francisco, was low bidder and probably will be awarded the general contract at $4,137,000 for the 58 to 70-in. welded steel Hetch Hetchy pipe line. As stated above, the Western Pipe & Steel Co. was low on the subcontract for the fabrication of the pipe. The latter company is also the low sub-contractor on 1000 tons of 30 and 36-in. welded steel pipe for Salt Lake City. The Willamette Iron & Steel Co. is low bidder on 400 tons for four steel derrick scows for the United States Engineer office, Portland. No new inquiries of size developed during the week. Prices hold around 2c., c.i.f.

SHAPES

Awards of structural shapes exceeded 3500 tons. Among the larger lots were 1300 tons for the Sixth Street viaduct, Los Angeles, booked by the Virginia Bridge & Iron Co., 1000 tons for an automobile sales building in Los Angeles, placed with McClintic-Marshall Corpn., and 300 tons for an addition to a factory in Pittsburg, Cal., secured by the Moore Dry Dock Co. The general contract for the Islais Creek bridge, San Francisco, involving 1100 tons, has been placed, but the general contractor has not yet awarded the subcontract for the steel fabrication and erection. The Judson-Pacific Co. was low bidder on 800 tons for the new Post Office in Oakland. Bids are to be called for shortly on 2000 tons for the Silver Spray pier, Long Beach. Shapes range from 2.05c. to 2.15c., c.i.f.

CAST IRON PIPE

A slight improvement in demand for cast iron pipe was noted this week. The American Cast Iron Pipe Co. took 468 tons of 8 to 14-in. Class B pipe for Santa Barbara, Cal. Bids will be opened May 29 on a fair-sized tonnage for Los Angeles. No award has yet been made on the 28-in. pipe line for Aberdeen, Wash., involving more than 2000 tons of 28-in. pipe.

SHEETS

Most of the larger sales and inquiries for plain and corrugated galvanized sheets originate from makers of culverts, but no outstanding tonnages have been in the market of late. Blue annealed, No. 10 gage, is quoted at 2.50c., c.i.f.; black sheets, No. 24 gage, hold at 3c.; and No. 24 gage galvanized sheets are quoted at 3.50c., c.i.f.

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Total production of babbitt metal in April was 2,560,243 lb., compared with 2,661,211 lb. in March, according to reports received by the Bureau of the Census from 43 manufacturers.

ST. LOUIS

Basic Pig Iron Melt Increasing—Steel Scrap Sold to Mills

ST. LOUIS, May 26.—The melt of basic pig iron in the St. Louis industrial district is reported to be increasing, as is evidenced by orders for larger shipments being received by the makers. The increase in the number of heats is said to be due largely to railroad orders and to the construction of the East St. Louis approach to the municipal bridge. The only activity in the stove foundries is in the manufacture of stock, which is largely being done to maintain organization personnel. Malleable plants are said to be doing very little. Shipments of the local maker are ahead of those for April at this time. Prices are unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	15.42
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

FINISHED STEEL

The situation has been helped to some extent by the desire of railroads to speed up shipments of material, orders for which had been placed and held up. A leading plate mill is busy on an order received several weeks ago for construction of the East Side approach to the municipal bridge. Otherwise, there has been only a light demand for plates, shapes and bars.

The only structural awards of the week were 150 tons for a college building to the Mississippi Valley Structural Steel Co. and 100 tons for some boat work to the St. Louis Structural Steel Co. The Laclede Steel Co. was awarded 200 tons for a college building at Baton Rouge, La.

OLD MATERIAL

Sales of heavy melting steel to several of the mills in the district were made by dealers during the week. Dealers are buying only sufficient scrap to turn over from day to day. They are holding for higher prices scrap that has been laid down in their yards. While some are willing to lay down additional tonnages, it is understood that they are being dissuaded by local bankers. No. 2 heavy melting steel is off 25c. a ton.

Railroad lists: Union Pacific, 2450 tons; Chicago & Alton, 645 tons; New York, Chicago & St. Louis, 23 carloads; Milwaukee Road, 12 carloads; Nashville, Chattanooga & St. Louis, 9 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	$8.25 to	$8.75
No. 1 heavy melting or shoveling steel	8.00 to	8.50
No. 2 heavy melting or shoveling steel	7.25 to	7.75
No. 1 locomotive tires	10.00 to	10.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	8.75 to	9.25
Railroad springs	10.00 to	10.50
Bundled sheets	6.00 to	6.50
No. 2 railroad wrought	8.00 to	8.50
No. 1 busheling	5.75 to	6.25
Cast iron borings and shoveling turnings	5.50 to	6.00
Iron rails	8.00 to	8.50
Rails for rolling	10.00 to	10.50
Machine shop turnings	2.75 to	3.25
Heavy turnings	6.00 to	6.50
Steel car axles	12.00 to	12.50
Iron car axles	17.50 to	18.00
Wrot. iron bars and trans.	9.00 to	9.50
No. 1 railroad wrought	6.00 to	6.50
Steel rails, less than 3 ft.	11.00 to	11.50
Steel angle bars	8.00 to	8.50
Cast iron carwheels	7.00 to	7.50
No. 1 machinery cast	8.00 to	8.50
Railroad malleable	8.25 to	8.75
No. 1 railroad cast	8.00 to	8.50
Stove plate	7.00 to	7.50
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 70 lb. and over	20.00 to	21.00
Agricult. malleable	7.50 to	8.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.60c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.60c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.10c.
Galv. corrug. sheets	4.65c.
Structural rivets	4.15c.
Boiler rivets	4.15c.

	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60 and 10
Carriage bolts	60 and 10
Lag screws	60 and 10
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60 and 10
Less than 200 lb.	50 and 10

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BUFFALO

Scrap Bought at Lower Prices—Steel Operations Off Slightly

BUFFALO, May 26.—The market for pig iron is inactive. A little spot business is offered but in small volume. Shipments over the barge canal are small, compared with those of last year, the competition of Eastern and Southern furnaces making it difficult for Buffalo furnaces to sell at the lower end of the canal except at sharp concessions.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$17.00
No. 2X fdy., sil. 2.25 to 2.75	17.50
No. 1 fdy., sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	25.28

FINISHED STEEL

The Lackawanna plant of the Bethlehem Steel Co. has reduced operations to 12 open-hearths; mill operations are at about 50 per cent. The Republic Steel Corpn. is continuing to operate three open-hearths, Wickwire Spencer three, and Gould Coupler one. The Seneca Iron & Steel Co. is operating at about 50 per cent. It is said that 1000 tons of fabricated structural steel for the new Attica prison has been awarded to a fabricator outside this district. About 300 tons of reinforcing bars for the new Granger & Flickinger warehouse has been placed, as well as 800 tons of reinforcing bars for the Harlem Valley hospital at Wingdale, N. Y. Reinforcing bar business is reported considerably improved, with an increase in the volume of small orders.

OLD MATERIAL

Half a dozen dealers are said to have participated in a sale of 2000 to 3000 tons of No. 1 heavy melting steel and No. 2 heavy melting steel to the leading consumer here. This business is understood to have been taken at $10 for the No. 1 steel and $8.50 for the No. 2 steel. This consumer is now offering to buy at 50c. below these prices. Another consumer was offered No. 2 heavy melting steel at $8.50, but declined to purchase. The market is almost lifeless, and prices continue to soften.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	$9.50 to	$10.00
No. 2 heavy melting scrap	8.00 to	8.50
Scrap rails	10.00 to	10.50
Hydraul. comp. sheets	8.50 to	9.00
No. 2 hydraul. comp. sheets	8.00 to	8.50
Hand bundled sheets	8.00 to	8.50
Drop forge flashings		8.50
No. 1 busheling		8.50
Hvy. steel axle turnings	8.50 to	9.50
Machine shop turnings	4.50 to	5.00
No. 1 railroad wrought	7.50 to	8.00
Acid Open-Hearth Grades:		
Knuckles and couplers	12.00 to	12.50
Coil and leaf springs	12.00 to	12.50
Rolled steel wheels	12.00 to	12.50
Low phos. billet and bloom ends	13.00 to	14.00
Electric Furnace Grades:		
Short shov. steel turnings	6.00 to	6.50
Blast Furnace Grades:		
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings	6.00 to	6.50
No. 2 busheling	4.50 to	5.00
Rolling Mill Grades:		
Steel car axles	15.00 to	15.50
Iron axles	16.00 to	16.50
Cupola Grades:		
No. 1 machinery cast	10.00 to	10.50
Stove plate	8.00 to	8.25
Locomotive grate bars	7.00 to	7.50
Steel rails, 3 ft. and under	13.00 to	13.50
Cast iron carwheels	11.50 to	12.00
Malleable Grades:		
Industrial	10.50 to	11.00
Railroad	10.50 to	11.00
Agricultural	10.50 to	11.00
Special Grades:		
Chemical borings	9.00 to	9.50

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.15c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.60c.
Bands	3.50c.
Hoops	3.90c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.60
Black wire, base per 100 lb.	3.20

CANADA

Pig Iron and Scrap Users Buy Sparingly—Structural Steel Dull

TORONTO, May 26.—Business in the Canadian pig iron markets is without trend. Melters are buying sparingly for immediate needs and show no indication of changing this policy. No future buying has been done for two or three weeks, although a number of melters covered some time ago for delivery to the end of June and are taking scheduled deliveries. Current demand is for small lots. The future of the iron and steel industry, according to consumers, is too uncertain to justify heavy bookings for long term delivery. Prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	20.50

STRUCTURAL STEEL

The demand for structural steel has fallen into a dull state recently. No large contracts have been closed in two or three weeks. While several large jobs are in prospect, it is understood that steel bookings for these will be delayed for a few weeks. Building trades are comparatively quiet. Fabricators are still operating about 75 per cent of capacity, but several plants have almost cleaned up orders and will cut operations within a week or 10 days unless new orders appear. Total awards for the week in the Toronto district were around 1500 tons.

OLD MATERIAL

Consumers are buying sparingly for immediate needs. Mills are showing little interest in the market, with the result that heavy melting steel and turnings are almost stagnant in their movement. Iron grades are spotty, with the most important orders being for machinery cast. Stove plate and malleable scrap made a poor showing during the week. Dealers are virtually out of the market and have made no recent revision in buying prices.

Dealers' buying prices for old material:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	....	10.00
Stove plate	....	8.00
Standard carwheels	....	8.50
Malleable	....	8.00
Per Net Ton		
No. 1 mach'ry cast	11.00	....
Stove plate	9.00	....
Standard carwheels	10.00	....
Malleable scrap	9.00	....

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A Comparison of Old and New Prices for Steel Sheets as Affected by the New Classification

UNDER the new classification for steel sheets, which will be fully effective it is expected, in the third quarter, the net prices on some grades will be higher and some will be lower than the current levels. The change is brought about both by changes in the base prices and in the differentials. On hot-rolled annealed sheets (now called black sheets) the trend will be generally upward. No change will occur on the various gages of heavy hot-rolled annealed (now blue annealed). On cold-rolled sheets, the net prices will be higher on single pickled and lower on full pickled. Heavy cold-rolled sheets, single pickled, will be higher and heavy cold-rolled, full pickled, will be lower.

A comparison of the old and new prices follows:

	OLD PRICE OPCR Annealed	NEW PRICE Hot-Rolled Annealed	Change
17 gage	1.95	2.05	0.10
18	2.05	2.10	0.05
19	2.05	2.15	0.10
20	2.05	2.20	0.15
21	2.20	2.25	0.05
22	2.20	2.30	0.10
23	2.20	2.35	0.15
24 (Base)	2.25	2.40	0.15
25	2.35	2.45	0.10
26	2.35	2.50	0.15
27	2.40	2.55	0.15
28	2.50	2.65	0.15
29	2.65	2.80	0.15
30	2.75	2.90	0.15

	Steel Blue Annealed	(Heavy) Hot-Rolled Annealed	Change
8 gage and heavier	1.80	1.80	0.00
9-10 base	1.85	1.85	0.00
11	1.90	1.90	0.00
12	1.95	1.95	0.00
13	2.00	2.00	0.00
14	2.05	2.05	0.00
15	2.10	2.10	0.00
16	2.15	2.15	0.00

	SPCR	Cold-Rolled	Change
17 gage	2.60	2.80	0.20
18	2.70	2.85	0.15
19	2.70	2.90	0.20
20 (Base)	2.70	2.95	0.25
21	2.85	3.00	0.15
22	2.85	3.05	0.20
23	2.85	3.10	0.25
24	2.90	3.15	0.25
25	3.00	3.20	0.20
26	3.00	3.25	0.25

	FPFCR	Cold-Rolled	Change
17 gage	2.95	2.80	—0.15
18	3.05	2.85	—0.20
19	3.05	2.90	—0.15
20 (Base)	3.05	2.95	—0.10
21	3.20	3.00	—0.20
22	3.20	3.05	—0.15
23	3.20	3.10	—0.10
24	3.25	3.15	—0.10
25	3.35	3.20	—0.15
26	3.35	3.25	—0.10

	SPCR	(Heavy) Cold Rolled	Change
8 gage and heavier	2.30	2.30	0.00
9-10 base	2.30	2.35	0.05
11	2.30	2.40	0.10
12	2.40	2.45	0.05
13	2.40	2.50	0.10
14	2.40	2.55	0.15
15	2.45	2.60	0.15
16	2.45	2.65	0.20

	FPFCR	(Heavy) Cold Rolled	Change
8 gage and heavier	2.55	2.30	—0.25
9-10 base	2.55	2.35	—0.20
11	2.55	2.40	—0.15
12	2.65	2.45	—0.20
13	2.65	2.50	—0.15
14	2.65	2.55	—0.10
15	2.70	2.60	—0.10
16	2.70	2.65	—0.05

Coke Production Off Slightly in April

Production of coke decreased slightly in April in spite of the continued upward trend in the output of pig iron. The decrease in the rate of coke production was entirely accounted for by the merchant plants and was probably due chiefly to the close of the heating season and the coming of milder weather. At furnace plants a slight increase occurred, which was associated with the advance of 2.7 per cent in the output of pig iron. The gain in iron production, however, was concentrated in the early part of the month; toward the end of April there was a marked contraction in the operating rate, and the month closed with a net loss of three active furnaces.

The total production of by-product coke for April amounted to 3,146,490 tons, an average of 104,883 tons a day. In comparison with the March average of 105,042 tons, this is a decrease of 0.2 per cent. In all, a total of 88 by-product plants were active during the month and these operated at about 63 per cent of their potential capacity.

The production of beehive coke for April is estimated at 108,600 tons, or 4177 tons a day. Production of all coke was 3,255,090 tons, as against 3,405,589 tons in the previous month.

Monthly Production of By-Product and Beehive Coke

(Figures in Net Tons)

Monthly Total:	By-Product Coke	Beehive Coke	Total
April, 1930	4,246,436	301,700	4,548,136
March, 1931	3,256,289	149,300	3,405,589
April, 1931	3,146,490	108,600	3,255,090
Daily Average:			
April, 1930	141,548	11,604	153,152
March, 1931	105,042	5,742	110,784
April, 1931	104,883	4,177	109,060

▲ ▲ ▲

Electric locomotives to the number of 72, valued at $599,927, were shipped in the first quarter of 1931, as against 140, valued at $968,157, shipped in the first quarter of 1930, according to reports received by the Bureau of the Census from nine manufacturers, comprising practically the entire industry.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

MILL PRICES OF SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$29.00 to $30.00
Rerolling, 4-in. and under 10-in., Youngstown	29.00 to 30.00
Rerolling, 4-in. and under 10-in., Cleveland	29.00 to 30.00
Rerolling, 4-in. and under 10-in., Chicago	31.00 to 32.00
Forging quality, Pittsburgh	35.00 to 36.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$29.00 to $30.00
Youngstown	29.00 to 30.00
Cleveland	29.00 to 30.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$29.00 to $30.00
Youngstown	29.00 to 30.00
Cleveland	29.00 to 30.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.65c.
Universal	1.65c.
Sheared	1.65c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	35.00

PRICES OF RAW MATERIAL

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	$12.00 to $12.50

	Per Gross Ton
Chrome ore, 45% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$20.00
Chrome ore, 48% Cr_2O_3 crude, c.i.f. Atlantic seaboard	22.50

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.40
Foundry, f.o.b. Connellsville prompt	$3.25 to 4.75
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.50
Mine run coking coal, f.o.b. W. Pa.	1.40 to 1.50
Gas coal, 3¼-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	75c. to 85c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	*$80.00 to $85.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*80.00 to 85.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$28.00 to $30.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

	Per Gross Ton Furnace		Per Gross Ton Furnace
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	39.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$25.00	13%	$29.00
11%	26.00	14%	31.00
12%	27.00	15%	33.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$19.00 to $21.00	11%	$22.00 to $24.00
7%	19.50 to 21.50	12%	23.00 to 25.00
8%	20.00 to 22.00	13%	25.00 to 27.00
9%	20.50 to 22.50	14%	27.00 to 29.00
10%	21.00 to 23.00	15%	29.00 to 31.00

Delivered prices at Chicago are about 50c. a ton below this schedule.

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd, carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	24.50c. to 26.00c.
Ferrochromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	122.50
Silico-manganese, gross ton, delivered	135.00

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$14.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

Per 1000 f.o.b. Works

	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$40.00 to $43.00	$32.00 to $35.00
Maryland	40.00 to 43.00	32.00 to 35.00
New Jersey	40.00 to 43.00	.....
Ohio	40.00 to 43.00	32.00 to 35.00
Kentucky	40.00 to 43.00	32.00 to 35.00
Missouri	40.00 to 43.00	32.00 to 35.00
Illinois	40.00 to 43.00	32.00 to 35.00
Ground fire clay, per ton	6.50	

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	$45.00
Chicago	49.00
Birmingham	47.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

MILL PRICES OF BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	73
†Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex. nuts, blank or tapped	73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagons nuts	73
Semi-finished hexagons castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh.	80, 10, 10 and 5
Stove bolts in packages, Chicago	80, 10, 10 and 5
Stove bolts in packages, Cleveland	80, 10, 10 and 5
Stove bolts in bulk, P'gh.	80, 10, 10, 5 and 2½
Stove bolts in bulk, Chicago	80, 10, 10, 5 and 2½
Stove bolts in bulk, Cleveland	80, 10, 10, 5 and 2½
Tire bolts	60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.75
F.o.b. Chicago	2.85

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c. to 1.70c.
F.o.b. Chicago	1.70c. to 1.80c.
Del'd Philadelphia	1.94c. to 1.99c.
Del'd New York	1.98c. to 2.03c.
F.o.b. Cleveland	1.65c. to 1.70c.
F.o.b. Lackawanna	1.75c. to 1.80c.
F.o.b. Birmingham	1.80c.
C.i.f. Pacific ports	2.25c.
F.o.b. San Francisco mills	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c. to 1.65c.
F.o.b. Birmingham, mill lengths	1.75c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mill	1.60c. to 1.65c.
Del'd Philadelphia	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago	1.70c. to 1.80c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.80c.
F.o.b. Birmingham	1.80c.
Del'd Cleveland	1.83½c.
Del'd Philadelphia	1.85½c.
F.o.b. Coatesville	1.75c.
F.o.b. Sparrows Point	1.75c.
F.o.b. Lackawanna	1.75c.
Del'd New York	1.93c.
C.i.f. Pacific ports	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.80c.
F.o.b. Birmingham	1.80c.
F.o.b. Lackawanna	1.75c.
F.o.b. Bethlehem	1.75c.
Del'd Cleveland	1.83½c.
Del'd Philadelphia	1.76c.
Del'd New York	1.90½c.
C.i.f. Pacific ports	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.60c. to 1.65c.
Wider than 6 in., P'gh	1.50c. to 1.55c.
6 in. and narrower, Chicago	1.65c. to 1.75c.
Wider than 6 in., Chicago	1.55c. to 1.65c.
Cooperage stock, P'gh	1.80c. to 1.90c.
Cooperage stock, Chicago	1.80c. to 1.90c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	*2.45c. to 3.40c.
Strips, P'gh	2.15c.
Strips, Cleveland	2.15c.
Strips, deliv'd Chicago	2.43c.
Strips, Worcester	2.30c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.20c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.35c.
Galvanized staples	2.60c.
Barbed wire, galvanized	2.55c.
Woven wire fence, per net ton	$60.00

	Base per Keg
Standard wire nails	$1.80 to $1.90
Smooth coated nails	1.80 to 1.90
Galvanized nails	3.80 to 3.90

To Retail Trade

	Base per Lb.
Bright wire	2.30c.
Smooth annealed wire	2.40c.
Smooth galvanized wire	2.90c.

	Base per Keg
Standard wire nails	$2.00
Cement coated nails	2.00
Galvanized nails	4.00

	Base per Lb.
Polished staples	2.45c.
Galvanized staples	2.70c.
Barbed wire, galvanized	2.65c.
Woven wire fence, per net ton	$65.00

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

(Prices of sheet mill products under new classification on page 1793.)

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh	1.85c.
No. 10, blue annealed, f.o.b. Chicago dist.	1.95c.
No. 10, blue an'l'd, del'd Phila.	2.14c. to 2.19c.
No. 10, blue annealed, B'ham	2.00c. to 2.05c.
No. 10, blue annealed, Pacific Coast ports	2.50c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.00c.
No. 13, f.o.b. Chicago dist.	2.10c.
No. 13, del'd Philadelphia	2.29c.
No. 13, blue annealed, B'ham	2.15c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.15c. to 2.25c.
No. 24, f.o.b. Chicago dist. mill	2.35c.
No. 24, del'd Philadelphia	2.44c. to 2.54c.
No. 24, f.o.b. Birmingham	2.40c.
No. 24, c.i.f. Pacific Coast ports	3.00c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh	3.40c. to 3.50c.

Galvanized

No. 24, f.o.b. Pittsburgh	2.80c.
No. 24, f.o.b. Chicago dist. mill	2.90c.
No. 24, del'd Cleveland	2.98½c.
No. 24, del'd Philadelphia	3.24c.
No. 24, f.o.b. Birmingham	2.80c. to 2.90c.
No. 24, c.i.f. Pacific Coast ports	3.50c.

Continuous Mill Sheets

No. 10 gage	1.70c.
No. 13 gage	1.85c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.55c. to 2.65c.
No. 28, f.o.b. Chicago dist. mill	2.65c. to 2.75c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.00c. to 3.10c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill:	
Unassorted	3.15c.
Assorted	3.25c.
Primes only	3.35c.

Vitreous Enameling Stock

No. 10, Pittsburgh (carloads)	3.10c.
No. 20, Pittsburgh (carloads)	3.60c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$5.00
Standard cokes, f.o.b. Gary	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package 20 x 28 in.)

8-lb. coating I.C.	$10.30
15-lb. coating I.C.	12.90
20-lb. coating I.C.	14.00
25-lb. coating I.C.	$15.20
30-lb. coating I.C.	16.60
40-lb. coating I.C.	17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential
2000 (1¼% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold drawn bars is ⅜c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.70
Spikes, ½ in. and larger	2.70
Spikes, boat and barge	$2.90
Tie plate, steel	1.95
Angle bars	2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	9
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	43	26½	¼ and ⅜	+13	+48
¼ to ⅜	49	32½	½	23	7
½	55	44½	¾	28	12
¾	60	49½	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	33	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 5%, and on galvanized by 1½ points, with supplementary discounts of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3½ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

FABRICATED STRUCTURAL STEEL

New Projects and Awards Each Total 20,000 Tons—New York Building Requires 6000 Tons

NEW projects and awards of fabricated structural steel this week each total about 20,000 tons, compared with 52,500 tons of new inquiry and 16,000 tons of awards a week ago. Included in the week's total of new business are a 6000-ton bank building at Broad Street and Exchange Place, New York, a 2000-ton pier at Long Beach, Cal., and a 2000-ton boiler plant for the Western Electric Co. in Chicago.

Awards of fabricated steel are generally small, except for a viaduct in St. Louis, 3000 tons, an auditorium in St. Paul, 2000 tons, a theater in Nashville, Tenn., 1730 tons, and a building in Chicago for the Commonwealth Edison Co., 1200 tons. Awards follow:

North Atlantic States

WORCESTER, MASS., 310 tons, art museum wing, to Eastern Bridge & Structural Co.

BOSTON, 295 tons, gas company warehouse in Jamaica Plain, to New England Structural Co.

HULL, MASS., 300 tons, bridge, to Eastern Bridge & Structural Co.

STATE OF CONNECTICUT, 200 tons, school buildings, to an unnamed fabricator.

MIDDLETOWN, CONN., 300 tons, building for Wesleyan University, to Lehigh Structural Steel Co.

ERIE RAILROAD, 250 tons, bridge in State of New York, to Ingalls Iron Works.

NEW YORK, 300 tons, building at Forty-fourth Street and Sixth Avenue, to Taylor-Fichter Steel Construction Co.

NEW YORK, 420 tons, apartment building at 310 East Fifty-fifth Street, to McClintic-Marshall Corpn.

NEW YORK, 200 tons, Fourth Church of Christ Scientist, 185th Street and Fort Washington Avenue, to Bethlehem Fabricators, Inc.

BROOKLYN, 150 tons, loft building at Pearl and Willoughby Streets, to Kues Brothers.

FOREST HILLS, N. Y., 170 tons, apartment building for Cord-Meyer Development Co., to Klein Iron Works.

PHILADELPHIA, 500 tons, boiler house for Pennsylvania Sugar Co., to McClintic-Marshall Corpn.

STATE OF PENNSYLVANIA, 275 tons, two highway bridges, to American Bridge Co.

BALTIMORE & OHIO RAILROAD, 250 tons, bridge, to American Bridge Co.

SCHUYLER, N. Y., 475 tons, bridge for New York Central Railroad, to Jones & Laughlin Steel Corpn.

The South

NASHVILLE, TENN., 1730 tons, theater for Warner Brothers, to Nashville Bridge Co.

GREENWOOD, MISS., 800 tons, bridge over Yazoo River for Columbus & Greenville Railway, to Virginia Bridge & Iron Co.

Central States

DETROIT, 270 tons, storage building for General Electric Co., to American Bridge Co.

STATE OF IOWA, 100 tons, highway bridge, to Vierling Steel Works.

STATE OF MISSOURI, 100 tons, highway bridge, to Vierling Steel Works.

INDIANAPOLIS, 500 tons, baseball park grandstand, to Insley Mfg. Co.

CHICAGO, 1200 tons, Commonwealth Edison Co., to American Bridge Co.

CHICAGO, 250 tons, Historical Society building, to an unnamed bidder.

CHICAGO, 300 tons, additional tonnage for Fine Arts building, to Hansell-Elcock Co.

CHICAGO, 850 tons, University of Chicago field house, to American Bridge Co.

CHICAGO & NORTH WESTERN RAILROAD, 700 tons, track elevation, to American Bridge Co.

GREAT NORTHERN RAILWAY, 300 tons, bridge, to Wisconsin Bridge & Iron Co.

LASALLE, ILL., 250 tons, highway bridge, to Worden-Allen Co., Milwaukee.

ST. PAUL, MINN., 2000 tons, auditorium, to St. Paul Foundry Co.

WABASH RAILWAY, 220 tons, bridge, to Stupp Brothers Bridge & Iron Co., St. Louis.

ALTON, ILL., 150 tons, Principia College buildings, to Mississippi Valley Structural Steel Co.

ST. LOUIS, 3000 tons, viaduct for terminal railway, to Mississippi Valley Structural Steel Co.

Western States

SEATTLE, 135 tons, sheet steel piling, cofferdam at Ford plant, to unnamed German bidders.

PITTSBURG, CAL., 300 tons, addition to Paraffine Companies plant, to Moore Dry Dock Co.

SACRAMENTO, 113 tons, bridge over Trinity River, Trinity County, to an unnamed bidder.

SANTA ANA, CAL., 154 tons, subway crossing, Southern Pacific tracks, to an unnamed bidder.

LOS ANGELES, 1300 tons, Sixth Street viaduct, to Virginia Bridge & Iron Co.

LOS ANGELES, 750 tons, automobile sales building, Wilshire Boulevard and Mariposa Street, to McClintic-Marshall Corpn.

LOS ANGELES, 220 tons, hospital, 2301 Bellevue Avenue, to McClintic-Marshall Corpn.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

WISCASSET-EDGECOMB, ME., 980 tons of steel and 21 tons of machinery for bridge.

BOSTON, 500 tons, Washington Street theater.

ERVING, MASS., 191 tons, State bridge over Central Vermont Railway.

EVERETT, MASS., 150 tons, Merrimac Chemical Co. bisulphite plant.

FRYEBURG, ME., 250 tons, highway bridge.

STATE OF NEW YORK, 750 tons, highway bridge.

PHILADELPHIA, 500 tons, addition to Girard College.

STATE OF NEW YORK, 200 tons, prison at Walkill, N. Y.

YONKERS, N. Y., 100 tons, fire and police stations Nos. 53 and 57.

YONKERS, unstated tonnage, Polish Community House.

MOUNT VERNON, N. Y., 200 tons, grade school No. 7.

WHITE PLAINS, N. Y., 125 tons, St. Bernard's parochial school.

WINFIELD, N. Y., 100 tons, St. Mary's parochial school.

BROOKLYN, 225 tons, Good Shepherd parochial school.

NEW YORK, 125 tons, Our Lady of Lourdes parochial school, Springfield and Ninety-third Avenues, Borough of Queens.

NEW YORK, 6000 tons, Continental Bank building at Broad Street and Exchange Place; general contractors, Thompson Starret Co.

BLOOMFIELD, N. J., 100 tons, public elementary school.

Central States

CLEVELAND, 1500 to 1800 tons, plant for Addressograph-Multigraph Co.; previously reported as 800 tons.

CLEVELAND, 100 tons, Ohio Bell Telephone building.

RAVENNA, OHIO, 150 tons, Robinson Hospital.

WANATAH, IND., 200 tons, bridge.

SHAWANO, WIS., 275 tons, Wolf River State highway bridge; bids close June 4.

STATE OF WISCONSIN, 2000 tons, highway bridges.

CHICAGO, 2000 tons, boiler house for Western Electric Co.

MISSOURI PACIFIC RAILROAD, 900 tons, bridges in Arkansas.

KANSAS CITY, MO., 4400 tons, Post Office; Ring Construction Co., Minneapolis, low bidder on general contract.

Western States

MONTALVO, CAL., 1000 tons, highway bridge.

LONG BEACH, CAL., 2000 tons, Silver Spray pier; bids to be called at once.

SAN FRANCISCO, 1100 tons, Islais Creek bridge; Barrett & Hilp, general contractor.

OAKLAND, CAL., 800 tons, Post Office; Judson-Pacific Co., low bidder.

SAN FRANCISCO, 35,000 tons, plates, Hetch Hetchy pipe line; Western Pipe & Steel Co., low bidder.

PORTLAND, ORE., 120 tons, plates, four steel derrick scows for United States Engineer Office; Willamette Iron & Steel Co., low bidder.

SALT LAKE CITY, 1000 tons, plates, 30 and 36-in. welded steel pipe; Western Pipe & Steel Co., low bidder.

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Railroad Equipment

Wheeling Steel Corpn. has awarded contract to Koppel Industrial Car & Equipment Co. for the repair of 42 gondola cars.

Amtorg Trading Corpn. has ordered 25 air dump cars from Magor Car Corpn., in addition to 60 recently ordered from same builder.

Central of New Jersey has ordered five locomotive tenders from Lima Locomotive Works.

Lehigh & New England has placed one six-wheel locomotive with Baldwin Locomotive Works.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Down to 8.75c.—Tin and Zinc Quiet—Lead Active

NEW YORK, May 26.

THE WEEK'S PRICES, CENTS PER POUND FOR EARLY DELIVERY

	May 26	May 25	May 23	May 22	May 21	May 20
Lake copper, New York	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Electrolytic copper, N. Y.*	8.50	8.50	8.50	8.50	8.50	8.50
Straits tin, spot, N. Y.	22.75	23.00	....	23.30	23.10	23.20
Zinc, East St. Louis	3.30	3.30	3.30	3.30	3.35	3.35
Zinc, New York	3.65	3.65	3.65	3.65	3.70	3.70
Lead, St. Louis	3.60	3.60	3.60	3.60	3.60	3.60
Lead, New York	3.75	3.75	3.75	3.75	3.75	3.75

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

COPPER

Electrolytic copper has sold at the lowest price in its history, or 8.50c., delivered in the Connecticut Valley. After holding for several days at 9c. from all sellers, one custom smelter on May 20 took business at 8.75c. Primary producers did not follow the decline and are quoting 9c. The 8.75c. price is the lowest since 1894, when Lake copper was selling at 9c., with electrolytic, then a comparatively new product and hardly a factor in the market, at about ¼c. under Lake. The lowest price at which Lake copper ever was sold was 8.75c. in the 1880's. On one day last week some electrolytic was sold at 8.50c., delivered in the Connecticut Valley. Today metal at the 8.75c. level is reported rather scarce, with some custom smelters asking 9c. Sales to domestic consumers last week were the largest since February, the total exceeding that for any three weeks since. The foreign price is unchanged at 9.27½c., c.i.f. usual European ports, with sales light. Total sales to foreign users thus far this month are about 16,500 gross tons, or practically the same as the March and April volume. Lake copper is quiet at 9c. to 9.12½c., delivered.

TIN

Fair sales of spot Straits tin were made last week, mostly for June delivery. The business was about equally divided between consumers and dealers. Since then the market has been very quiet, with practically no business reported. Prices in the London market have fallen about £4 a ton during the week, due largely to the weakness here in the stock market and to the tone of the remarks of the president of the United States Steel Corpn. at last Friday's meeting of the American Iron and Steel Institute. Prices in the New York market have also sagged, holding around 23c., New York. The quotation today for spot Straits tin here was 22.75c., New York. Shipments of tin from the Straits to May 23, inclusive, have been 6544 tons. Stocks of tin in British warehouses as of May 23 were 29,837 tons, an increase of 714 tons in the week.

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LEAD

An optimistic tone is sounded in this market. Sales late last week and yesterday were the largest in some time and were of course mostly for June shipment. It is reported that the total would indicate a larger consumption next month than during May. The buying was representative of most avenues of consumption, which is also considered encouraging. Prices are unchanged at 3.75c., New York, or 3.60c., St. Louis.

ANTIMONY

Chinese metal, in the absence of any demand of consequence, is a little lower at 6.40c., New York, for spot and 6.30c. for futures.

ZINC

Demand for prime Western zinc is light, although some business has been done each day. There has been a slight recession in quotations down to 3.30c., East St. Louis, or 3.65c., New York. At this level some producers are disinclined to make sales except to regular customers. In the ore market prices are still holding at $19 to $20, with sales somewhat restricted. Last week 2140 tons changed hands, but shipments were down to 2928 tons which, with a production of 5000 tons last week, resulted in an increase in stocks of a little over 2000 tons, bringing them to 58,475 tons. For July and August delivery a premium of two and one-half points

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	16.25c.
*Copper, hot rolled, base sizes	18.87½c.
Seamless Tubes—	
Brass	19.25c.
Copper	21.37½c.
Brass Rods	14.50c.
Brazed Brass Tubes	24.87½c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.00c. to 9.50c.
Zinc sheets, open	10.00c. to 10.50c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	24.75c. to 25.75c.
Tin, bar	26.75c. to 27.75c.
Copper, Lake	10.50c. to 11.00c.
Copper, electrolytic	10.25c. to 10.75c.
Copper, casting	10.00c. to 10.50c.
Zinc, slab	4.50c. to 5.50c.
Lead, American pig	4.75c. to 5.75c.
Lead, bar	6.75c. to 7.75c.
Antimony, Asiatic	9.00c. to 10.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	24.00c. to 25.00c.
Alum. ingots, No. 12 alloy	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	18.00c. to 19.00c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	27.25c.
Tin, bar	29.25c.
Copper, Lake	10.25c.
Copper, electrolytic	10.25c.
Copper, casting	9.25c.
Zinc, slab	5.50c.
Lead, American pig	4.75c. to 4.90c.
Lead, bar	7.75c.
Antimony, Asiatic	10.00c.
Babbitt metal, medium grade	15.00c.
Babbitt metal, high grade	31.50c.
Solder, ½ and ½	19.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.75c.	7.50c.
Copper, hvy. and wire	6.50c.	7.25c.
Copper, light and bottoms	5.50c.	6.25c.
Brass, heavy	3.50c.	4.50c.
Brass, light	3.00c.	4.00c.
Hvy. machine composition	5.50c.	6.25c.
No. 1 yel. brass turnings	4.25c.	4.75c.
No. 1 red brass or compos. turnings	5.00c.	5.75c.
Lead, heavy	2.50c.	3.00c.
Zinc	1.25c.	1.75c.
Sheet aluminum	10.00c.	12.00c.
Cast aluminum	5.00c.	7.50c.

on prime Western is asked, with about five points for September.

NICKEL

Electrolytic cathodes are quoted at 35c. a lb., with shot and ingot nickel made from remelted electrolytic at 36c. a lb. for single lots of spot metal.

ALUMINUM

Published prices are unchanged at 22.90c. a lb., delivered, for virgin metal, 98 to 99 per cent pure.

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Reinforcing Steel

Awards the Largest in Several Weeks

THE total of reinforcing steel awards the past week, 9100 tons, was the largest for any week since April 12, when contracts for 12,600 tons were let. Included in the week's business is 2000 tons for a hydroelectric dam at Kingsland, Tex., 1000 tons for anchorages for the Tri-borough bridge, New York, and 900 tons for a Post Office in Boston. New inquiries have fallen to a smaller volume and call for only 4600 tons compared with 6400 tons in the previous week. The largest project is 1000 tons for a war memorial building in San Francisco. Awards follow:

BOSTON, 900 tons, Post Office, to Northern Steel Co.

BOSTON, 350 tons, Boston Consolidated Gas Co. Jamaica Plain warehouse, to Northern Steel Co.

BOSTON, 250 tons, Charlestown school, to Barker Steel Co.

BOSTON, 170 tons, Edison Electric Co. plant addition, to Barker Steel Co.

BOSTON, 170 tons, city hospital unit, to Barker Steel Co.

DEERFIELD-GREENFIELD, MASS., 200 tons, State bridge, to Concrete Steel Co.

SPRINGFIELD, MASS., 200 tons, armory, to Bethlehem Steel Co.

STATE OF CONNECTICUT, 400 tons, school, to an unnamed bidder.

NEW YORK, 400 tons of wire mesh, fireproofing elevated structure in Brooklyn for Board of Transportation, to Concrete Steel Co.

NEW YORK, 1000 tons, anchorages for Triborough bridge, Arthur McMullen Co., general contractor, to Carroll-McCreary Co.

NEW YORK, 150 tons, gymnasium for Hunter College, to Tidewater Structural Material Corpn.

BRENTWOOD, N. Y., 900 tons, buildings for Brentwood Hospital; foundations, 200 tons, to Igoe Brothers, and superstructure, 700 tons, to Carroll-McCreary Co.

STATE OF NEW JERSEY, 150 tons, highway construction in Hudson County, A. R. Geist Contracting Co., Secaucus, N. J., to Igoe Brothers.

ENGLEWOOD, N. J., 400 tons, paving construction, Giovanni Construction Co., Bergenfield, N. J., general contractor, to Igoe Brothers.

BUFFALO, 300 tons, Granger & Flickinger warehouse, to Concrete Steel Co.

WINGDALE, N. Y., 800 tons, Harlem Valley Hospital, to Truscon Steel Co.

MASON CITY, IOWA, 100 tons, Post Office, to Inland Steel Co.

CHICAGO, 130 tons, field house for University of Chicago, to Joseph T. Ryerson & Son, Inc.

CHICAGO, 125 tons, Historical Society building, to Joseph T. Ryerson & Son, Inc.

KINGSLAND, TEX., 2000 tons, hydroelectric dam, Fegles Construction Co., Minneapolis, general contractor, to Tennessee Coal, Iron & Railroad Co.

BATON ROUGE, LA., 200 tons, women's dormitory for Louisiana State University, to Laclede Steel Co.

SACRAMENTO, 112 tons, bridge over Santa Ana River, Orange County, to an unnamed bidder.

LOS ANGELES, 150 tons, Kress Store, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

MERION, PA., 200 tons, administration building for Lower Merion high school.

NEW YORK, 100 tons, foundations for Continental bank building, Broad Street and Exchange Place; Thompson Starrett Co., contractor.

NEW YORK, 100 tons, overhead track viaduct in New York Central Railroad yards at West Thirtieth Street; Arthur McMullen Co., general contractor.

BROOKLYN, 700 tons, Sheepshead Bay sewer; Alvin Contracting Co., Brooklyn, general contractor.

STATE OF NEW JERSEY, 500 tons, highway construction, including bridges in Bergen County; bids open June 1.

WASHINGTON, 700 to 800 tons, terrace foundations and garage, Capitol Building; bids taken May 28 by Capitol architect.

WASHINGTON, 200 tons, conservatory building, Botanical Gardens; bids taken May 27 by Department of Agriculture.

WASHINGTON, 246 tons, Standard Oil office building; general contract to Joseph Stewart & Co., New York.

WASHINGTON, 125 tons, American Pharmaceutical Memorial building; bids taken May 25.

CHICAGO, 500 tons, rebuilding viaduct on Mannheim Road.

KENOSHA, WIS., tonnage not stated, track elevation for Chicago & North Western.

RACINE, WIS., 500 tons, highway bridges.

SACRAMENTO, CAL., 240 tons, paving in Colusa County; bids June 10.

SAN FRANCISCO, 255 tons, Hetch Hetchy pipe line project; general contract awarded.

SAN FRANCISCO, 1000 tons, war memorial building; K. E. Parker, San Francisco, general contractor.

OAKLAND, CAL., 150 tons, Post Office; bids being taken.

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George D. Whitcomb Co., Rochelle, Ill., recently purchased by Baldwin Locomotive Works, has been reorganized as the Whitcomb Locomotive Co. and will operate as a self-contained unit, with Baldwin executives as directing officials. George H. Houston, president of Baldwin Locomotive Works, is president of the new company. H. H. Perry, former vice-president of Industrial Brownhoist Corpn., is vice-president and general manager, and H. V. Huleguard is sales manager. Charles E. Acker and Arthur L. Church, treasurer and secretary respectively of the Baldwin company, will hold similar offices in the reorganized Whitcomb company.

Building Material Prices Under Investigation

WASHINGTON, May 26.—The Federal Trade Commission is making an investigation of the building material industry. The inquiry was ordered in a resolution introduced by Senator Shipstead of Minnesota. The commission also is making an inquiry into cement prices in response to a resolution by Senator Norris of Nebraska, and is said to have almost completed this work.

The building material industry inquiry, according to the commission, relates to the letting of contracts for the construction of Government buildings. The commission will make a particular effort, it stated, to determine "whether or not there are or have been any price fixing or other agreements, understandings, or combinations of interests among individuals, partnerships, or corporations engaged in the production, manufacture, or sale of building materials with respect to the prices or other terms at or under which such materials will be furnished contractors or bidders for such construction work."

The inquiry covers all kinds of building materials. In view of market and price conditions at this time, there is a feeling that the commission has selected a poor period to embark upon its work.

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Smaller Production of Trackwork in April

Shipments of trackwork in April are reported by the American Iron and Steel Institute at 8564 net tons. This is a drop of 4 per cent from the March total of 8944 tons, but otherwise is the largest month's figure since that of last July. It is, however, the smallest April total since these figures have been reported.

For the first four months, shipments aggregated 29,455 net tons, compared with 50,958 tons in the first four months of 1930 and a somewhat larger quantity in 1929. The figures cover all special or fabricated T-rail trackwork—switches, switch-stands, frogs, crossings, guard rails and appurtenances—of carbon steel, manganese steel and other metals. They include material for both domestic and export use in track laid with standard T-rails of 60 lb. a yard and heavier.

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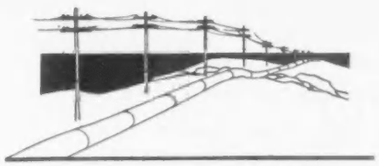
Yeomans Brothers Co., Chicago, has appointed the following new representatives: Andriot Davidson Co., 1307 Starks Building, Louisville, Ky.; Johns Equipment Co., First National Bank Building, Fort Wayne, Ind.; H. A. Grossman Co., 3221 Olive Street, St. Louis.



PIPE LINES

Award of 6000 Tons—Inquiry Calls for 15,000 Tons

HIGH spots of the week in pipe line projects are the award of 6000 tons of seamless pipe for the Memphis Natural Gas Co., an inquiry for 15,000 tons for a Standard Oil of New Jersey subsidiary and the opening of bids on 35,000 tons for a water line on the Pacific Coast. Details of the week's developments follow:

Ford, Bacon & Davis, Inc., New York, is reported to have placed 110 miles of 8-in. seamless pipe, weighing approximately 6000 tons, for the Memphis Natural Gas Co., Memphis, Tenn., to the National Tube Co.

Lycoming Natural Gas Co., a subsidiary of the Standard Oil Co. of New Jersey, is in the market for approximately 100 miles of 20-in. pipe, calling for 15,000 tons of steel, for a gas line in northern Pennsylvania and southwestern New York.

Western Pipe & Steel Co. is the low bidder on the sub-contract for the fabrication of the 58 to 70-in. welded steel pipe line for the Hetch Hetchy project, San Francisco, bids on which were opened on May 20. About 35,000 tons is involved. Youdall Construction Co., Matson Building, San Francisco, is low bidder on general contract.

Sub-contract for the 30 to 36-in. welded steel pipe line for Salt Lake City, involving 1000 tons, may soon be placed by Morrison-Knudsen Co., Boise, Idaho, the general contractor. The Western Pipe & Steel Co., San Francisco, is low.

Utah Gas & Coke Co., Salt Lake City, Utah, has plans for new natural gas pipe lines to cost about $900,000, including line at Midvale and vicinity to cost $400,000; and from Provo to Springville and Spanish Fork, to cost $500,000.

Sinclair Consolidated Oil Corpn., 45 Nassau Street, New York, will soon begin construction of a pipe line from Teague, Tex., to east Texas oilfields, about 85 miles. It will connect with present line of Pure Oil Co., near first noted place, and is scheduled to be finished during summer. Contract has been let to Federal Construction Co., Denver, for another line for Sinclair system from Longview-Joiner field, east Texas, to Mexia, Tex., and vicinity.

T. A. Gillespie Co., 7 Dey Street, New York, has been awarded the contract for furnishing and laying about 6500 tons of large-diameter steel pipe for the Hackensack Water Co. The plates and lock bars will be rolled by the Carnegie Steel Co.

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April Motor Car Output Gained 59,303 Units

WASHINGTON, May 26.—Reflecting an increase of 59,303 units, production of motor vehicles in the United States in April totaled 335,708, compared with 276,405 in March, according to reports received by the Department of Commerce.

Passenger car output rose to 285,028 from 230,834, while truck production increased to 50,015 from 45,161.

April production in Canada was 17,159, compared with 12,993.

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Further Drop in Wholesale Prices

Commodity prices in April are on the basis of 73.3 in place of 74.5 in March, and of 90.7 a year earlier. These figures, from the United States Bureau of Labor Statistics, are based on the average of 1926 as 100 and cover 550 commodities.

With a single exception, all 10 major groups showed declines, housefurnishings alone having withstood the pressure. Metals and metal products dropped a fraction to 88.7 from 89 in March. This is accounted for by a drop from 88.1 to 87.5 in iron and steel, a drop of two points to 65.1 in non-ferrous metals, an increase from 98 to 98.6 in automobiles, and no change in agricultural implements and other metal products. There was no change, likewise, in the structural steel element of the building materials group.

Raw materials, semi-manufactured articles and finished products all showed drops of slightly more than one unit, on a base averaging about 75. The drop was thus approximately 1½ per cent in each instance.

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Sheet Metal Ware Output and Shipments Higher

WASHINGTON, May 22.—The production of galvanized sheet metal ware in March totaled 146,438 doz. pails and tubs and 31,542 doz. pieces of other ware, comparing with 132,781 doz., and 34,347 doz. respectively in February, according to reports received by the Bureau of the Census from 13 establishments. March shipments of pails and tubs increased to 144,637 doz., valued at $369,842 from 120,723 doz., valued at $341,547 in February. Shipments of other ware in March rose to 29,579 doz., valued at $190,954, from 28,142 doz., valued at $172,368.

Shipments of enameled sheet metal ware in March totaled 312,916 doz. pieces, valued at $1,161,148, against 289,205 doz., valued at $1,044,682, in February, according to reports from 15 manufacturers.

Foundry Equipment Orders Off in April

Foundry Equipment Manufacturers' Association reports a marked falling off in orders in April as compared with March. The April index figure is 57.7, compared with 174.4 in March. The March business was the best since February, 1930. This association uses as a base of 100 the average monthly shipments for 1922, 1923 and 1924.

Shipments of foundry equipment in April, however, fell off only slightly from those of the month before, and the index of unfilled orders as of April 30 is 180.07, compared with 195.7 one month before.

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Steel Scrap Declines Again at Detroit

DETROIT, May 26.—Heavy melting steel has declined 25c. a ton for the second consecutive week, but other items, except hydraulic bundles, are unchanged. The market is virtually devoid of transactions on the part of consumers. Dealers see no hope of a pickup in the near future. June scrap lists from automobile companies indicate a moderate recession in motor car output next month.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$7.50 to	$8.00
Borings and short turnings	3.75 to	4.25
Long turnings	3.00 to	3.50
No. 1 machinery cast	8.25 to	8.75
Automotive cast	11.00 to	11.50
Hydraul. comp. sheets	6.50 to	7.00
Stove plate	6.25 to	6.50
New No. 1 busheling	6.50 to	7.00
Old No. 2 busheling	2.50 to	3.00
Sheet clippings	4.25 to	4.75
Flashings	6.50 to	7.00

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American Rolling Mill Co., Middletown, Ohio, on May 21 reelected the entire directorate. The board will again consist of J. H. Frantz, Charles R. Hook, H. M. Runkle, J. Frank Drake, W. S. Horner, J. M. Hutton, J. P. Orr, F. A. Simpson, Paul Sturtevant, W. L. Allen, Calvin W. Verity and George M. Verity.

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Ray D. Love was elected president of the Betz-Pierce Co., Cleveland, steel jobber, to succeed the late Clifford E. Pierce at a reorganization meeting May 25. Mrs. Clifford E. Pierce succeeded Mr. Love as vice-president. Nelson Larsen was elected treasurer and R. H. Southworth was reelected secretary.

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Arthur G. McKee & Co., Cleveland, have taken a contract for two McKee hot blast stoves with metal bottoms for "C" furnace of the Campbell works of the Youngstown Sheet & Tube Co.

British Steel Reorganization Makes Substantial Progress

(*By Cable*)

LONDON, ENGLAND, May 26.

THE National Federation of Iron and Steel Manufacturers has replied to the Iron and Steel Trades Confederation, agreeing with many statements of the Confederation, but points out that regional organization of the industry has already made substantial progress.

The Federation definitely opposes State control, and urges protection of domestic markets with a judicial board to protect consumers' interests.

The general business situation is unchanged, the Whitsuntide holiday having but little effect. Midland furnaces have secured a few small pig iron orders at the recently reduced quotations, but Cleveland makers are maintaining prices, except on sales to Scotland. Gjers, Mills & Co. have started two Ayresome hematite furnaces on a special order.

Steel business is quiet and the outlook is gloomy with shipbuilding stagnant.

The tin plate market is quiet with sales at 14s. 6d. to 15s. ($3.40 to $3.65) per base box, f.o.b., works port. The Continent and Canada are the most active export markets, but tonnages bought are unimportant. The Eagwe works will resume operation early in June.

No. 24 gage corrugated galvanized sheets in bundles are quoted at £10 5s. (2.22c. per lb.), f.o.b. works port and lower might be acceptable on favorable specifications.

Black sheets are quiet, but prices are maintained. Japan has taken a few small lots of thin gage sheets.

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Chinese Tientsin-Pukow Railway buys 16 locomotives from British makers.

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British National Federation of Iron and Steel Manufacturers opposes recent suggestion of State control for industry.

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Steel sheets specially formed for concrete highway reinforcement developed in Great Britain.

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Guest, Keen, Baldwins Iron & Steel Co. blast furnace makes 4250 tons of iron in week, establishing new British record.

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Continental price weakness is unchecked, with mills seeking orders to maintain operations and buyers cautious although showing certain interest. The Continental Wire Rod Cartel has made no change in prices or quotas.

British Guest, Keen, Baldwins Iron & Steel Co. reports that its No. 4 furnace broke the British record with 4250 tons of pig iron output in the week ended May 16.

The Tientsin-Pukow Railway has placed orders with British manufacturers for 16 Pacific and Mikado type locomotives.

The South African Union Steel Corporation has decided to expand its Vereeniging tube plant. Production of ferromanganese at the Newcastle furnaces has been deferred until prices improve, but manufacture of rock-drill steel is to be undertaken.

German output in April was 530,000 tons of pig iron, with 58 furnaces in blast at the end of the month, and 743,000 tons of raw steel.

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Rustless Steel Prices Lower in Europe

DÜSSELDORF, GERMANY, May 4.—Although there are only a few companies in Europe producing high-chrome-nickel alloy steels, competition is keen. In Germany, the Friedrich Krupp A. G., Essen, controls all patents, and there are four leading makers in the United Kingdom, of which Thomas Firth & Sons and the Brown Bayleys Steel Works, Ltd., are among the largest. In Sweden, the Avesta A. B. and the Fagersta A. B. are the leading makers, and in France there are licensees under foreign patents.

Much of the present competition for rustless steel business is between Swedish and other producers, and prices have been steadily reduced despite only minor declines in the cost of chrome and nickel. In 1925, the quotation for chrome-nickel alloy steel was £140 a ton (30.87c. a lb.) in 1929, the price had declined to £110 a ton (24.20c. a lb.); in 1930, the average quotation was £100 a ton (22c. a lb.), and more recently £90 a ton (19.84c. a lb.).

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at $4.8665 (par)

British Prices, f.o.b. United Kingdom Ports

Ferromanganese, export	£9	0s.	to	£11	5s.	$43.74	to	$54.75
Billets, open-hearth	5	2½	to	5	10	24.91	to	26.76
Black sheets, Japanese specifications	10	5				49.82		
Tin plate, per base box	0	14½	to	0	15	3.52	to	3.65
						Cents a Lb.		
Steel bars, open-hearth	7	17½	to	8	7½	1.71	to	1.81
Beams, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Channels, open-hearth	7	12½	to	8	2½	1.66	to	1.76
Angles, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Black sheets, No. 24 gage	8	10				1.84		
Galvanized sheets, No. 24 gage	10	5				2.22		

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2	7s.	to	£2	9s.	$11.42	to	$11.90
Billets, Thomas (nominal)	£3	4s.	to	£3	5s.	15.55	to	15.80
Wire rods, low C., No. 5 B.W.G.	5	2½	to	5	7½	24.94	to	26.15
Rails, light	6	0				29.20		
Black sheets, No. 31 gage, Japanese	11	5	to	12	12	54.68	to	58.32
						Cents a Lb.		
Steel bars, merchant	3	12	to	3	13	0.78	to	0.79
Beams, Thomas, British standard (nominal)	3	8	to	3	9	0.76	to	0.77
Channels, Thomas, American sections	5	12	to	5	14	1.24	to	1.26
Angles, Thomas, 4-in. and larger, over ⅜-in. thick	3	11	to	3	12	0.77	to	0.78
Angles, Thomas, 3-in.	3	12	to	3	13	0.78	to	0.79
Hoops and strip steel over 6-in. base	4	5	to	4	7	0.92	to	0.94
Wire, plain, No. 8 gage	4	18½				1.08		
Wire, barbed, 4-pt. No. 12 B.W.G.	8	12½				1.90		

British Develop New Anti-Aircraft Gun

WASHINGTON, May 26.—A new anti-aircraft gun has been developed by Messrs. Vickers, Armstrong & Co., Newcastle-on-Tyne, England, says the Iron and Steel Fortnightly, Department of Commerce. The gun, which is for sale to foreign governments has a caliber of 75 mm. and fires 15-lb. shells at 25 rounds a minute. The maximum vertical range is five and a half miles and the maximum horizontal range nearly eight miles. The weight is three and a half tons.

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British Use Sheet Metal to Reinforce Concrete

WASHINGTON, May 26.—A new method of reinforcing concrete has been developed by Super-Strength Metals, Ltd., Stockton-on-Tees, England, says the Department of Commerce. The new method employs steel girders, formed by folding metal sheets containing the same amount of metal as ordinary round bars, but claimed to possess 67 times greater strength. The new method is being applied largely in construction of reinforced concrete highways and is said to withstand modern traffic exceptionally well.

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Portugal a Market for Diesel Motors

WASHINGTON, May 26.—Portugal is becoming a market for internal combustion engines, says a report to the Department of Commerce from Lisbon. Various industries have adopted the Diesel and semi-Diesel engines because of their low initial costs and economical operation. There is increasing use of stationary Diesel engines in the textile, olive oil and stone industries and marine Diesel motors are beginning to be used by operators of fishing boats. In the provinces, a market is developing for engines to be used in the production of electricity. The textile industry uses engines of 50 to 200 hp., olive oil crushers and stone crushers from 10 to 15 hp., and electric light installations use from 50 to 450 hp.

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German Engineers Mark Seventy-Fifth Year

The seventy-fifth anniversary of the Verein Deutscher Ingenieure (Association of German Engineers) will be celebrated at the annual meeting of the association in Cologne June 27 to 29. The association was formed in 1856 by 23 engineers who gathered in Alexisbad in the Harz mountains, and today includes in its membership more than 31,000 engineers, members of 53 district sections and 29 local branches in Germany and branch societies in Argentina, China and Japan. On May 12, a memorial statue was dedicated to the founders of the association at Alexisbad. The memorial depicts a young engineer fixing his gaze on some distant object and the base bears the phrase "Now to Work."

The chief discussions of the meeting in Cologne will be problems of radiation, emphasizing the relationship between problems of engineering and modern physics. There will be 11 meetings at which papers will be read and discussed on combustion, welding in boiler construction, Diesel engines for driving motor trucks, light metals and traffic problems, measures for increasing speed of travel, problems of working lignite mines and flow problems in steam and water power engineering.

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Osaka Steel Merchants Cease Sheet Imports

OSAKA, JAPAN, April 16. — The Osaka Steel Sheet Association, an organization of merchants, decided at a recent meeting to abandon further importation of black sheets. As a result, the Black Sheet Joint Selling Union is investigating to locate possible importers not in the association. With British light-gage black sheets being offered at £10 17s. 6d. ($52.85) a ton, c.i.f. Japanese po t, and the Japanese domestic price at 141 yen ($69.51) a ton, delivered, the effort to curb imports may not prove to be successful.

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France's March Exports of Steel Declined

WASHINGTON, May 22.—Exports of iron and steel products from France in March totaled 266,833 metric tons, compared with 309,179 tons in February, according to a cablegram from Acting Commercial Attache Daniel J. Reagan, Paris. The largest single item of exports was steel bars, 88,190 tons, a drop of approximately 70,000 tons under February exports of this product.

March exports of pig iron were almost stationary at 42,939 tons, while outgoing shipments of ingots, blooms, billets and slabs amounted to 32,712 tons. Shipments of rails declined slightly to 27,561 tons, while those of wire rods rose 8000 tons to 17,673 tons. Other substantial exports were cast iron pipe, 15,347 tons; plates, 15,269 tons, and hot and cold-rolled strip steel, 11,654 tons.

The March production of pig iron in France was 775,000 tons and that of crude steel 722,000 tons.

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Pittsburgh Steel Co. and Pittsburgh Steel Products Co. have removed their offices to 968 Union Trust Building, Pittsburgh.

New Trade Publications

Air Compressors.—Davey Compressor Co., Kent, Ohio. Illustrated 16-page booklet under title of "4 Compressors Went to School," outlines results of 500-hr. continuous test of three water-cooled portable compressor outfits and one air-cooled Davey portable compressor.

Worm Gear Speed Reducers.—Foote Brothers Gear & Machine Co., 215 North Curtis Street, Chicago, Catalog, 80 pages, illustrating "IXL Hygrade" speed reducers; rating tables are included. Interesting chapters outline the evolution of worm gearing and describe modern methods of manufacture.

Tool Holders and Bits.—O. K. Tool Co., Shelton, Conn. Pamphlet on "Cutting Costs with Cutting Tools," describes holders and inserted cutter blades made by this company.

Spray Nozzles.—Schutte & Koerting Co., Twelfth and Thompson Streets, Philadelphia. Illustrated 32-page bulletin on nozzles and other equipment for standard, fountain, brine and chemical spray service. Capacity-pressure curves and installation diagrams are included.

Hydraulic Pumps.—John Robertson Co., 121 Water Street, Brooklyn, N. Y. Folder describing improved high-pressure vertical triplex pumps with forged-steel cylinder blocks for operation of presses and other hydraulic equipment. Features include Timken bearings on pinion shaft, circulating lubrication system, and herringbone gear drive fully inclosed in oil-tight case.

Sizes and Standard Extras.—Inland Steel Co., Chicago. A convenient 48-page booklet with all standard extras and differentials applying to bars, plates, structurals and rail steel products included, as well as complete lists of sizes rolled. The booklet is vest pocket size, and has a tough, durable cover.

Electric Hoists.—Wright Mfg. Co., Bridgeport, Conn. Catalog of 48 pages describing electric hoists, with dimensions and other useful data. The hoists include hook and bolt suspension; plain, geared and motor-driven trolleys; and drum and low-headroom types.

Leather Belting.—Charles A. Schieren Co., 30 Ferry Street, New York. Twelve-page pamphlet explaining in non-technical language the effect of belt tensions on the cost of belting. Charts and diagrams of power transmitted by leather belting under various tensions are included.

Gasketing Material.—Garlock Packing Co., Palmyra, N. Y. Folder describing a new gasketing material known as "button hole tape." It consists of two parallel courses of high-grade folded asbestos cloth joined together by a single ply of bonding fabric. As furnished the tape contains no holes, but insertion of a knife blade between the two parallel sections of the tape cuts the bonding fabric forming the "button hole" which may be slipped over the bolt or stud. The maker claims that with only a knife for a tool, a gasket may be made which will remain in place, fit correctly and lie flat. The tape is furnished in coils of any desired length and in all standard widths and thicknesses.

PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Companies Stressing Replacement

Sellers Utilizing Dull Period to Convince Users of Economies in New Tools

THE machine tool industry is utilizing the present dull period to convince machinery users that they can effect economies in production by replacing present obsolete equipment with new, cost-saving tools.

While such efforts are bearing little fruit under the existing conditions, it is believed that results will come when the general business situation has improved sufficiently to instill a feeling of confidence as to the future.

Business this month in virtually all sections of the country has fallen below that of April. New York dealers report that May probably will be the poorest month of the depression period. Dullness extends to inquiries as well as orders.

With summer approaching, the trade is not hopeful that a change for the better can be expected before early autumn, but that expectation is contingent on the possibility that the depression will show signs then of lifting.

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NEW YORK

Some of the local machine tool houses state that, unless there is an unexpected improvement in sales this week, May will be the poorest month thus far in the depression period. While business has not come to a complete standstill, it is closer to that point than the machine tool trade has experienced in a long time, even considering the fact that its dull periods are likely to be more accentuated than those of most other industries. The local trade, in scanning its prospects, does not see much chance for a change during the summer months, but is looking forward to early autumn with the hope that general business may by that time have shown some improvement that will give greater confidence to machine tool users.

CHICAGO

Dealers who are still receiving orders from the railroads are far more optimistic than are those who have had to build order books from miscellaneous sources. The purchase of tools by the Union Pacific and the Santa Fe have been helpful to the market as a whole. Orders from the Milwaukee Road are in prospect.

As a whole, average sales for May will show little or no improvement over those of April, and the outlook for June is not very encouraging. Fresh inquiries have been dragging for many weeks. A new committee is working on requirements for the Austin High School, Chicago. Grigsby-Grunow Co., which has purchased a few machine tools, is closely studying additional requirements.

NEW ENGLAND

Metal-working shops collectively are becoming more active, although improvement is slow. It is anticipated that further increases will be made in June and that July will be still more promising. Dealers are inclined to believe that, contrary to former expectations, machine tool sales in the summer will be moderately good.

CLEVELAND

Machine tool sales and inquiry continue light and the volume of business this month probably will be slightly below that of April. Dealers are developing some prospective business by concentrating efforts on attempts to convince machinery users that they can effect economies by replacing present obsolete equipment with new tools. While these efforts doubtless will bear fruit in time, there is still a disposition to withhold orders until the general business situation improves. The Board of Education, Shaker Heights, Ohio, received bids May 21 for a 14 in. x 6 ft. metal-working lathe and for the following wood-working machines: One tool grinder, one saw bench, one band jointer, one single surfacer, one cutter head, one 15-in. sander, one vertical hollow chisel mortiser, one 3-in. high-speed scroll and band saw, one belt sander and three wood turning lathes.

PITTSBURGH

Business this month is considerably quieter than in April and local dealers are not sanguine regarding improvement during the summer. New inquiry is almost entirely lacking and no sizable industrial lists are before the trade with the exception of that of the Westinghouse Electric & Mfg. Co., East Pittsburgh, on which no immediate action is expected. The railroads are buying little or nothing.

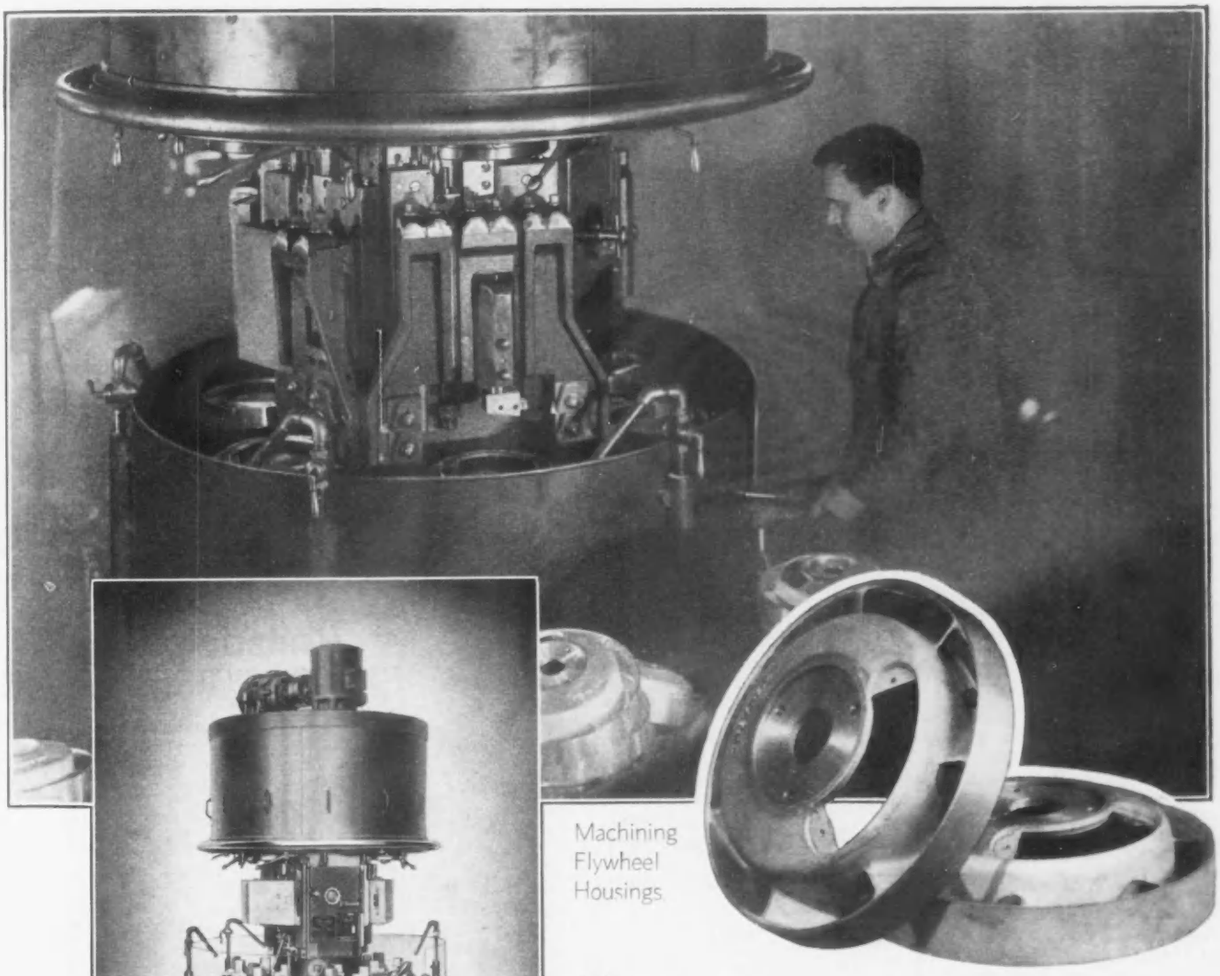
CINCINNATI

The machine tool market continues quiet and featureless. Demand is low and spotty and confined to occasional orders for single tools which is about sufficient to warrant production at the present low rate. With the approach of warm weather, a natural decline in demand is anticipated and little or no improvement is expected before the fourth quarter. Inquiry is almost negligible.

MILWAUKEE

A slight improvement in sentiment is noticeable in the machine tool trade. Inquiry the past week was fair, and sales were in somewhat better volume, although this is merely relative. Buying continues to be limited sharply to urgent needs. Sales of recently developed high-speed, high

THE BULLARD METHOD



Machining Flywheel Housings

MULTIPLE spindles, multiple tooling, individual feeds and speeds at each station combine to make the Mult-Au-Matic Method, wherein the time for the finished piece is the elapsed time of the longest machining operation.

If you have work similar to this job in sizes up to 16" diameter, our Engineers can give you interesting cost figures. Send prints or samples for estimates of The Method as applied to your jobs.

THE BULLARD COMPANY
Bridgeport Connecticut

production tools are surprisingly good, and manufacturers of such equipment are exerting efforts to sell users the idea of making replacements to effect economies. The number of men at work in local metal trades shops in April declined somewhat from the March average, but the decrease in number at work has been more than offset by the increase in number of hours worked per man a week.

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New York

CONTRACT has been let by New York Central Railroad Co., New York, to Aronberg-Fried Co., Inc., 21 East Fortieth Street, for ten-story cold storage and distributing terminal building, 100 x 103 ft., with railroad viaduct, at 450-56 West Fourteenth Street. E. A. Dougherty, is company architect.

Ovens, power equipment, conveying and other machinery will be installed in new plant to be built by National Biscuit Co., 449 West Fourteenth Street, New York, to cost over $500,000.

Overland Products Corpn., New York, has leased floor in building at 28-30 East Tenth Street, for manufacture of toys.

C. R. Benton and associates have taken over shipyard of B. F. Wood, Inc., City Island, N. Y., for new yacht-building and repair works. Yard has been closed for about two years and will be reopened at once. Former company name will be retained. Work is under way on expansion and improvements to cost about $25,000. Mr. Benton will be president and treasurer. Facilities will be provided for repair of vessels up to 250 tons capacity.

Electro-Metallurgical Corpn., 30 East Forty-second Street, New York, has awarded contract to Pittsburgh Bridge & Iron Works, Pittsburgh, for addition to plant at Charleston, W. Va., to cost over $100,000 with equipment. Company is a subsidiary of Union Carbide & Carbon Corpn.

Thomas T. Chaloner, 4304 Parsons Boulevard, Flushing, N. Y., and associates have organized United States Wayside Stop Signal Corpn., with capital of $500,000, and plan operation of local factory for manufacture of automatic railroad signals and signal equipment. Laurent Cateura, 2127 Thirty-third Street, Long Island City, is interested in organization.

International Cigar Machinery Co., Second Avenue and Fifty-sixth Street, Brooklyn, a subsidiary of American Machine & Foundry Co., same address, has purchased certain assets and property of Universal Tobacco Machine Co., 40 Paris Street, Newark, N. J., and will consolidate. Manufacture will be concentrated at Brooklyn works, including patented machines and parts heretofore produced by Universal company.

Department of Hospitals, Municipal Building, New York, plans early call for bids for steam power plant at institutional building in Brooklyn, to cost over $75,000 with equipment.

Long Island Shipyard, Inc., Port Jefferson, L. I., has secured permission to build a pier in Port Jefferson Harbor for yard expansion, including mechanical-handling equipment, to cost over $100,000.

Superintendent of Lighthouse, Staten Island, N. Y., is asking bids until June 2 for a quantity of cable.

Max Siegel, 1775 Broadway, New York, architect, has plans for a two-story automobile service, repair and garage building, 100 x 130 ft., to cost close to $100,000 with equipment.

Standard Railway Fusee Corpn., Fanny Road, Boonton, N. J., manufacturer of railway fuses, etc., is considering rebuilding part of plant recently destroyed by fire, with loss over $200,000 including machinery.

Orange Mfg. Co., 190 Emmet Street, Newark, manufacturer of metal badges and other metal novelties, has leased space in building at 63 Hoyt Street for new plant.

Passaic Valley Sewerage Commissioners, 24 Branford Place, Newark, will receive bids until June 3 for a one-story equipment storage and distributing building at Second River yard. J. Ralph Van Duyne is chief engineer.

Public Service Electric & Gas Co., Terminal Building, Newark, has arranged for preferred stock issue to total $31,650,000, part of fund to be used for extensions and improvements. Company has recently authorized expansion at Kearny power plant, with installation of 75,000-kw. turbo-generator and auxiliary equipment, and at Burlington generating station, where new 18,000-kw. generator will be installed, to cost more than $9,000,000. Company is also planning an addition to power substation at Irvington, N. J.

Wallace & Tiernan Co., Inc., 11 Mill Street, Belleville, Newark, manufacturer of chlorine control equipment, has taken over plant and business of Tanner Engineering Co., Long Island City, manufacturer of liquid recording instruments, etc. Production will be concentrated at Newark and Long Island City plant discontinued.

Service Machine Co., 750 Broadway, Elizabeth, N. J., recently celebrated completion and occupancy of its new plant by a reception to employees and their families. William F. Burditt, Jr., is president.

Watervliet Iron & Brass Foundry, Inc., Watervliet, N. Y., is planning expansion. Company has recently arranged for increase in capital from $25,000 to $75,000, part of proceeds to be used for such purpose.

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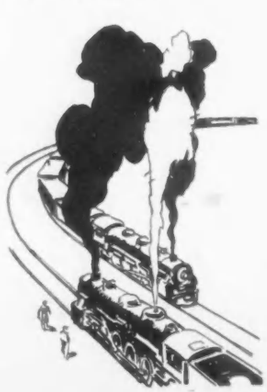
New England

CONTRACT has been let by Louis Epstein Radiator Repairing & Plating Co., 138 Washington Street, Quincy, Mass., to W. L. Lofgren, 19 Cottage Street, for one-story repair works, to cost about $35,000 with equipment.



National Foundry, Inc., Whitman, Mass., has been organized to operate local plant for production of iron, steel and other metal castings, by George J. Clark, West Hanover, Mass., and William A. Luce, Whitman.

Board of Selectmen, Winchester, Mass., is considering installation of manual training equipment in new two-story and basement junior high school, for which a fund of $250,000 is available. R. C. Sturgis, 120 Boylston Street, Boston, is architect.

General Alloys Co., 405 First Street, Boston, has closed agreement with Allegheny Steel Co., Brackenridge, Pa., for manufacture of its line of alloy steel castings and metals and will carry out production at local plant. Allegheny company sales organization will also handle such Allegheny alloy products as manufactured by General Alloys Co.

John J. Fogarty, 43 Birch Street, Worcester, Mass., and associates have organized Master Oil Burner, Inc., to operate local plant for manufacture of oil burners and oil-burning equipment. Mr. Fogarty will be treasurer. Michael A. Lavigne, Worcester, will be an official of company.

State Department of Correction, Boston, has plans for a one-story shop unit at State prison colony at Norfolk, to cost close to $50,000 with equipment. McLaughlin & Burr, 88 Tremont Street, Boston, are architects.

W. S. Brewer, city engineer, Hartford, Conn., about June 1 will take bids on a pump house and conduit work to cost $60,000.

Jenkins Brothers, South Main Street, Bridgeport, Conn., manufacturer of valves, has started work on a machine shop addition. A 110-ton electric traveling crane and radial drill will be installed.

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Philadelphia

BIDS have been asked on general contract by Reading Co., Reading Terminal, Philadelphia, for a one-story car repair shop at Third and Erie Streets, to cost over $75,000 with equipment. Clark Dillenback is company engineer, address noted.

Sun Oil Co., 1608 Walnut Street, Philadelphia, has awarded general contract to Hughes-Foulkrod Co., Schaff Building, for oil storage and distributing plant on 225-acre tract at Rensselaer, N. Y., including pumping station, automobile service and garage building and other units, to cost close to $200,000 with equipment. James F. Esposito is company engineer in charge. Sun company has taken over property at Sydney River, N. S., heretofore held by Provincial Oil, Ltd., its agent in Nova Scotia, and will develop bulk oil storage and distributing plants at that place, also at Bridgewater, Port Williams and Halifax, N. S. New units will be under direction of Sun Oil Co., Ltd., Montreal, Canadian subsidiary, in conjunction with Provincial Oil, Ltd.

United States Smelting Works, 1615-17 Spring Garden Street, Philadelphia, has acquired one-story building and property at Bristol and American Streets, 95 x 120 ft., and will remodel for new plant. Company recently sold present plant site and will remove to new location, where capacity will be increased.

Ford Brothers & Co., Inc., Philadelphia, has been organized to take over and ex-

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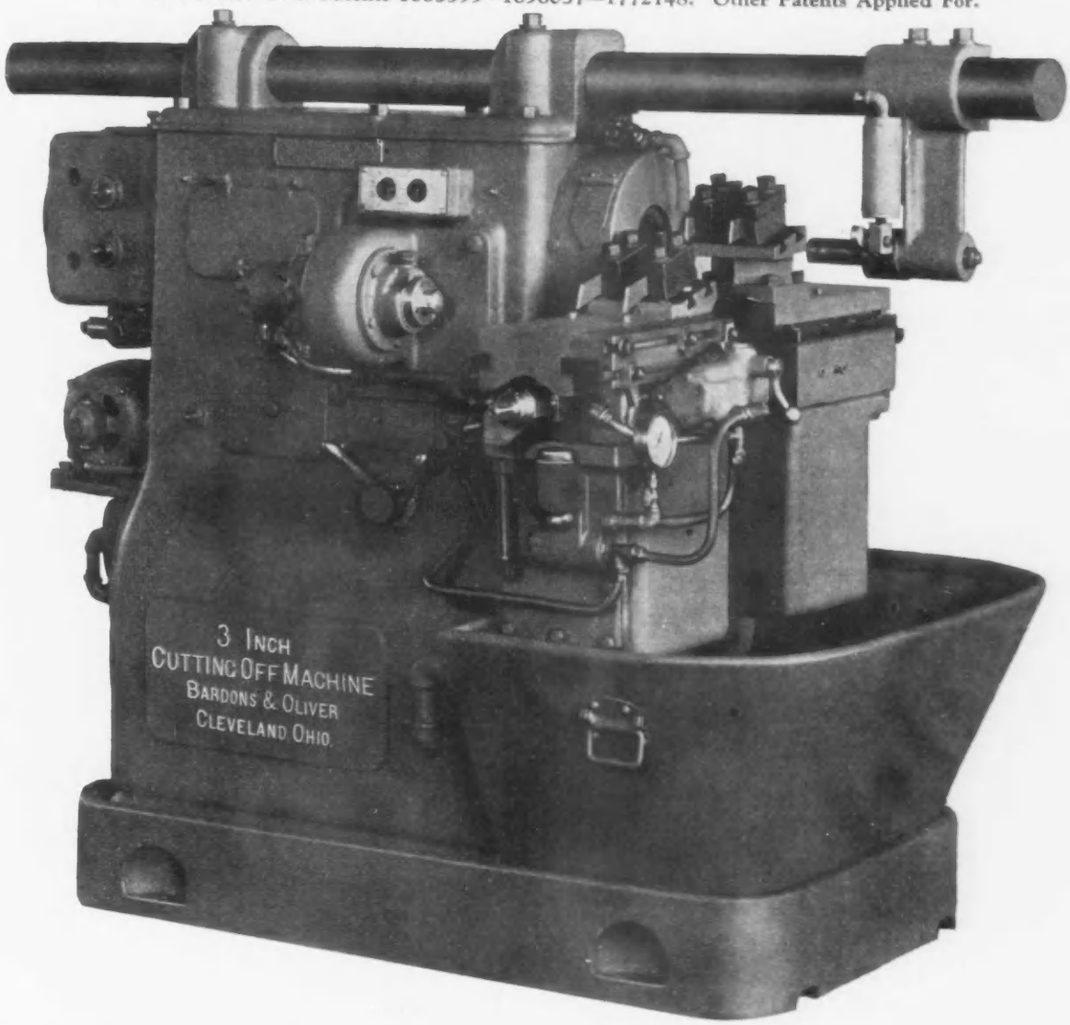

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Bardons & Oliver Automatic Cutting Off Machine

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Anti-Friction Bearings.....Hinged Type Collet.....Roller Bar Feed
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Built in two sizes—Capacities, 3″ & 4½″ Dia. by any length
Also Semi-Automatic Cutting Off Machines From 6″ to 16″ Capacity

BARDONS & OLIVER
Turret Lathes & Cutting Off Machines
Cleveland, Ohio

pand coppersmithing plant and business of company of same name at 1620 South Front Street. New organization will also manufacture sheet metal products, castings, forgings, etc. Lawrence S. Ford and Charles Heidman head new company.

John A. Stahr, 4549 North Fifteenth Street, Philadelphia, and associates are organizing Brunswick Fire Proofing Co., with capital of $300,000, to manufacture hollow building tile and kindred fireproofing products. Company is purchasing property at Milltown, N. J., for new works to cost over $75,000. Mr. Stahr will be president of new organization.

Metropolitan Edison Co., Reading, Pa., has arranged for a bond issue of $5,000,000, part of proceeds to be used for extensions and improvements, including transmission lines.

Pottstown Blower Co., Inc., Pottstown, Pa., has been organized with capital of $20,000 by Harry A. Norman, 715 Franklin Trust Building, Philadelphia, and associates, to operate local plant for manufacture of mechanical blowers and systems.

South Philadelphia Dressed Beef Co., 232 Moore Street, Philadelphia, has asked bids on general contract for new packing plant addition, to cost about $40,000 with mechanical-handling and other equipment. Stadler Engineering Co., 140 Liberty Street, New York, is engineer.

Board of Education, Souderton, Pa., contemplates installation of manual training equipment in new two-story and basement high school to cost about $100,000. Charles M. Talley is architect.

Budd Wheel Co., Philadelphia and Detroit, has acquired brake drum business of Holley Permanent Mold Machine, Inc. This drum is designed to meet severe conditions of braking brought about by higher speeds and free wheeling.

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Chicago

BIDS are being asked until June 15 by United States Engineer Office, First District, Chicago, for lock gate and lock valve operating machinery at Brandon Road and Dresden Island locks, Illinois waterway.

Board of Education, Ottawa, Ill., has plans for two-story vocational high school to cost over $175,000 with equipment. J. C. Llewellyn & Son, 38 South Dearborn Street, Chicago, are architects.

Chicago & Great Western Railroad Co., 122 South Michigan Avenue, Chicago, will carry out expansion and improvements at engine house and shops at Oelwein, Iowa, including installation of two motor-driven portable cranes and other equipment, to cost close to $100,000.

Great Northern Railway Co., Railroad Building, St. Paul, Minn., has plans for new power house at Havre, Mont., to use pulverized coal as fuel, to cost close to $100,000 with equipment. Company has superstructure under way for new steam-operated electric power plant at Williston, N. D., to cost about $85,000 with equipment. T. D. McMahon, address noted, is company architect.

Ruth Safety Garages, Inc., 38 South Dearborn Street, Chicago, will proceed with superstructure for twenty-eight-story service, repair and garage building at 329-35 Plymouth Court, to cost close to $1,000,000 with equipment. A. S. Graven, Inc., 100 North La Salle Street, is architect.

Robert Gage Coal Co., Bay City, Mich., has plans for a fuel briquette plant at Salida, Colo., to cost over $65,000 with machinery.

Bureau of Reclamation, Denver, will receive bids until June 5 for pumping plant No. 2 for Boulder City water supply service, Boulder Canyon project.

Common Council, Mohall, N. D., has been authorized to erect a municipal electric light and power plant, to cost over $50,000.

Foote Brothers Gear & Machine Co., Chicago, has been awarded contract by War Department for gate and valve operating machinery for guard locks at Great Bridge, Va., totaling $42,500.

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Buffalo

PLANS have been filed by Hecker-H-O Co., Inc., Genesee Building, Buffalo, for new grain elevator, to be operated in conjunction with cereal mills, to cost close to $500,000 with elevating, conveying, screening and other equipment.

Dosit Dish Washer Corpn., Rochester, N. Y., recently organized by Henry W. Clark, 30 Holcroft Road, and associates, with capital of $100,000, plans operation of local factory for manufacture of dish-washing machines and parts. George M. White, 31 Churchlas Place, is interested in company.

W. E. Sawyer, Bolivar, N. Y., operating local oil properties, is at head of project to construct a new oil refinery in oilfield district, to cost over $100,000 with machinery.

Porter-Cable Machine Co., Wolf Street, Syracuse, N. Y., manufacturer of lathes, disk grinders and other tools, has purchased plant and business of Kendrick Valve & Washer Co., 1708 North Salina Street, and will operate as a subsidiary, retaining present name.

Salamanca Furniture Works, Inc., Salamanca, N. Y., recently organized to manufacture radio cabinets and kindred specialties, has taken over several plants heretofore operated by Thomas McCabe Industries, Inc., at Salamanca and Coudersport, Pa., and will convert to new line of output. A. E. Boger is president, and Eugene T. Kieffer, vice-president and general manager.

Trico Products Corpn., 817 Washington Street, Buffalo, manufacturer of automobile equipment and accessories, has awarded general contract to Crooker & Carpenter, Crosby Building, for one-story addition, 95 x 190 ft., to cost close to $70,000 with equipment.

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Milwaukee

ANNOUNCEMENT is made that United States Hoffman Machinery Corpn., New York, intends to move equipment of Vorclone Corpn., Milwaukee, which it recently acquired, to its main works at Syracuse, N. Y., within six months. Vorclone company occupies leased quarters and lease expires in about 18 months. Both companies manufacture laundry and dry cleaning machinery.

Folding Furniture Works, Inc., Stevens Point, Wis., manufacturer of wood and metal furniture specialties, sustained a loss of about $100,000 by fire on May 16. Plans are being made to rebuild at once. New machinery will be required throughout.

Modine Mfg. Co., Seventeenth and Racine Streets, Racine, Wis., manufacturer of radiators for gasoline engines, space heaters, etc., has placed contracts for a four-story addition, 80 x 115 ft., costing about $75,000 with equipment.

Delta Mfg. Co., 3775 North Holton Street, Milwaukee, manufacturer of metal specialties, has started work on a two-story plant extension, 38 x 82 ft. and wing, 23 x 42 ft.

City Light and Water Commission, Lake Mills, Wis., contemplates building a new plant with Diesel engine equipment, costing about $65,000. Present contract with Southern Wisconsin Gas & Electric Co. expires Nov. 1. E. C. Dodge is chairman of commission.

Board of Public Works, Evansville, Wis., closes bids June 5 for construction and equipment of municipal sewage disposal plant designed by E. B. Parsons, consulting engineer, Watertown, Wis.

Kewaunee Mfg. Co., Kewaunee, Wis., manufacturer of scientific, vocational, school, library and home economics equipment, reports orders for $600,000 worth of equipment.

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St. Louis

CONTRACT has been let by Ralston Purina Co., 835 South Eighth Street, St. Louis, to Jones-Hettelsater Construction Co., Mutual Building, Kansas City, Mo., for new grain elevator, 50 x 112 ft., to cost about $200,000 with conveying, elevating, screening and other equipment.

Atchison, Topeka & Santa Fe Railway Co., 80 East Jackson Boulevard, Chicago, and Topeka, Kan., has awarded general contract to M. R. Stauffer, Newton, Kan., for extensions and improvements in shops and rail mill at Newton, including one-story bolt shop, 40 x 100 ft., and platform, 120 x 500 ft., to cost close to $50,000 with equipment. H. W. Wagner, Topeka, is division engineer.

American Eagle-Lincoln Aircraft Corpn., Kansas City, Mo., has been organized to consolidate American Eagle Aircraft Corpn., with local plant at Rickel Street and American Eagle Road, and Lincoln Aircraft Co., Inc., Lincoln, Neb., both manufacturers of airplanes and parts. Production in future will be concentrated at American Eagle plant, including parts production and assembling of different models. Victor H. Roos, heretofore president of Lincoln company, will be president and treasurer of new company.

St. Joseph Quarries Co., St. Joseph, Mo., has 25 acres of quarry properties near Karnes Road and plans development, including crushing, loading, conveying and other equipment. Project will cost over $25,000. E. H. Lawson, 505 Main Street, is president.

Oklahoma Aviation Service, Inc., Municipal Airport, Oklahoma City, Okla., has plans for a new one-story and basement hangar, 120 x 140 ft., with repair facilities and office unit, to cost about $35,000, including equipment. Langbein & Johnston, Hightower Building, are architects.

Northwestern Public Service Co., Omaha, Neb., has awarded general contract to Peter Kiewits Sons, Omaha National Bank Building, for new steam-operated electric power plant on Platte

IDEAS

for men who want to make savings in operating costs

Men who make it a point of keeping well informed on methods of getting costs down make it a point of going through The Iron Age every week from cover to cover. For they have found it to be a mine of ideas that they can put to practical use.

SPECIMENS OF WHAT WILL BE FOUND IN THE ADVERTISING PAGES OF THIS ISSUE:

Four Spiral Reamers Do the Work of 48 Straight Fluted Reamers

Three different shops watched their costs on reaming taper pin holes. Each found that a certain spiral reamer could be made to do the work of 12 or more straight fluted reamers.

Pressure-Sealed Valves Eliminate Leakage

A valve that is leakless when closed may leak when it is open. The disc in a certain type of valve is sealed by the fluid pressure and is said to insure leakless performance on air, gas, oil or water lines.

Plating Generators Improved

Smaller, lighter, rolled steel fabricated field frame and sub-base, better electrical characteristics.

Combination Saw and Abrasive Cut-Off Machine

The same machine takes either an 18-in. dia. metal-cutting saw or a 16-in. abrasive wheel. Cuts solid bars, tubing, light sections, etc. Change-over is quickly made.

New Automatic Cutting-Off Machine

For high production cutting-off. Two sizes, 3-in. and 4½-in. dia. capacities. Twin cut-off slides, hydraulic feed, multiple tools.

It pays to read the advertising pages regularly

River, near North Platte, Neb., to cost close to $375,000 with equipment. Extensions will be made in transmission lines.

Board of Education, Kansas City, Mo., has authorized installation of a vocational department in addition to Fairmount school, for which bids will soon be asked on general contract, to cost over $200,000. Charles A. Smith, Finance Building, is architect.

Cargill Grain Co., Omaha, Neb., has awarded general contract to Fegel Construction Co., Minneapolis, for addition to grain elevator, to cost over $500,000 with equipment.

Salina Grain & Milling Co., 912 West Ash Street, Salina, Kan., will soon take bids for new grain elevator, 56 x 120 ft., and 113 ft. high, with elevating, conveying, screening and other equipment, to cost over $100,000. I. L. Zerbe, 140 South Santa Fe Avenue, is architect.

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South Atlantic

BIDS have been asked by Sylvania Industrial Corpn., 122 East Forty-second Street, New York, manufacturer of transparent cellulose paper products, for three one and two-story additions to mill at Fredericksburg, Va., to cost about $750,000 with machinery. Ballinger Co., Twelfth and Chestnut Streets, Philadelphia, is architect and engineer.

Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, is disposing of a bond issue of $18,000,000, part of fund to be used for extensions and improvements in power plants and system, financing, etc.

Construction Quartermaster, Fort Monroe, Va., will receive bids until June 15 for 11 hangars with shop facilities, connecting bays and boiler houses for United States Air Corps at Langley Field, Hampton Roads, Va.

Champion Fibre Co., Canton, N. C., will carry out expansion and improvements at local fiber and paper mill, to cost over $150,000, including machinery. Later an auxiliary branch is planned for production of caustic soda, chlorine and kindred specialties.

Seaboard Public Service Co., an interest of National Public Service Co., 57 William Street, New York, has purchased artificial gas plants and properties of Carolina Gas & Electric Co., at Greenville, Washington, New Bern, Goldsboro, Kinston and Fayetteville, N. C. New owner plans expansion and betterments, with installation of additional equipment and distributing lines. Properties will be operated in conjunction with electric plants and system of Tide Water Power Co., an affiliated interest.

Department of Education, 1230 East Twentieth Street, Baltimore, Joshua R. Jolly, acting secretary, Board of School Commissioners, is asking bids until June 3 for equipment and supplies for different manual training divisions, including plumbing, printing, sign painting shops, etc.

Southeastern Compress & Warehouse Co., Spartanburg, S. C., has approved plans for new cotton storage and distributing plant at Greenville, S. C., to cost about $100,000 with conveying and other handling equipment. Company is a subsidiary of Anderson, Clayton & Co., Cotton Exchange Building, Houston, Tex.

Salem Steel Co., Winston-Salem, N. C., has arranged a new department at local

plant for production of all-steel boats. Company has secured contract for 1000 steel fishing boats, each 22 ft. long, to be completed by close of year.

General Purchasing Officer, Panama Canal, Washington, is asking bids until June 2 for woodworking machines, corrugated metal roofing, turnbuckles, chain shackles, staples, eye bolts, ring bolts, brass bolts, etc., until June 3 for one motor-generator set for storage battery charging, two motor-generator sets, and one 5-panel switchboard.

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Pittsburgh

BOARD of Public Education, Washington School, Washington Road, Mount Lebanon Township, Pa., will receive bids until June 11 for shop machinery for local high school. Charles L. Woolridge, Inc., 1027 Fulton Building, Pittsburgh, is architect.

Fort Pitt Casket Co., 1308 Penn Avenue, Pittsburgh, has leased six-story and basement building at 1018-20 Forbes Street for new factory branch, storage and distributing plant.

Pittsburgh Metal Cap & Seal Corpn., Pittsburgh, recently organized by M. W. Kurniker, 4403 Center Avenue, and associates, plans operation of local factory for manufacture of metal caps, seals, etc. Mr. Kurniker will be treasurer. Robert Carson, 653 Morewood Avenue, is interested in new organization.

United States Engineer Office, Pittsburgh, is asking bids until June 15 for construction of one 15-ton, steel hull, whirler derrick boat.

Springdale Foundry Co., Springdale, Pa., G. Chismark, Seventh and Mill Streets, Tarentum, Pa., in charge, is planning one-story foundry, 50 x 125 ft., for production of iron and steel castings, to cost about $35,000 with equipment.

Board of Public Education, Springdale, Pa., Benjamin Remaley, secretary, plans installation of manual training equipment in new high school to cost $150,000. An appropriation in that amount has been voted. Plans will soon be drawn.

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Detroit

CONTRACT has been let by Duluth, South Shore & Atlantic Railway Co., Duluth, Minn., to Merritt, Chapman & Whitney Corpn., Duluth, for new ore dock with 150 storage and distributing pockets at Marquette, Mich., to cost $1,800,000 with elevating, conveying and other handling equipment.

Board of Education, Detroit, plans installation of manual training equipment in new Redford High School to cost $775,000. Bids will soon be asked on general contract. Frank Eurich, Jr., Hofmann Building, is architect.

Oakland Motor Car Co., Pontiac, Mich., is planning establishment of a new factory branch, storage and distributing plant at Atlanta, Ga., including parts department, to cost over $75,000 with equipment.

Gillian Mfg. Co., 620 East Hancock Street, Detroit, recently organized, plans operation of local factory for manufacture of metal products. Irving T. and Charles S. Gillian are heads.

Dow Chemical Co., Midland, Mich., has acquired property near Wilmington, N. C., and contemplates new plant for extraction of bromine from sea water, to cost over $200,000 with machinery. Ethyl Gasoline Corpn., 135 East Forty-second Street, New York, is interested in project.

In connection with expansion and improvements at plant of Saginaw Malleable Iron Co., Saginaw, Mich., a division of General Motors Corpn., Detroit, equipment will be installed to increase production from 50,000 to 75,000 tons of castings a year. Company is developing highest output in history, surpassing April record for largest tonnage up to that time.

Michigan Sand & Gravel Co., Saginaw, Mich., has acquired waterfront property at Bay City, Mich., and is considering construction of new dock, with storage and distributing bins, including mechanical loading apparatus, conveyors and other handling equipment. Company is affiliated with Construction Materials Co., 33 North La Salle Street, Chicago.

Accurate Gear Co., 3171 Bellevue Avenue, Detroit, recently organized by T. R. Navin, Birmingham, Mich., and associates, plans operation of local factory for production of spur and bevel gears, pinions, etc. A. W. Russel, 1208 Hanna Building, Cleveland, is one of heads of company.

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Cleveland

TRACT of 30 acres at Euclid Village, has been purchased by Addressograph-Multigraph Corpn., 1814 East Fortieth Street, Cleveland, manufacturer of addressing machines, printing and duplicating machinery, parts, etc., as site for new plant and administration building, to cost close to $1,000,000 with equipment. Company represents merger of Addressograph Co., 901 West Van Buren Street, Chicago, and American Multigraph Co., address noted, and will concentrate production at new location.

National Milling Co., 2221 Front Street, Toledo, Ohio, operating grain elevators and mills, plans rebuilding part of storage and distributing plant recently destroyed by fire, with loss of more than $150,000 including mechanical-handling equipment.

Officials of Owens-Illinois Glass Co., 965 Wall Street, Toledo, Ohio, manufacturer of hollow ware, have organized Owens-Illinois Glass Co. of California, Ltd., a subsidiary, to erect a plant on Pacific Coast, for which site is now being selected. Works will include power house, machine shop and other structures, and will cost over $750,000 with machin-

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for cylinders up to 30 inches
for depths up to 18 inches

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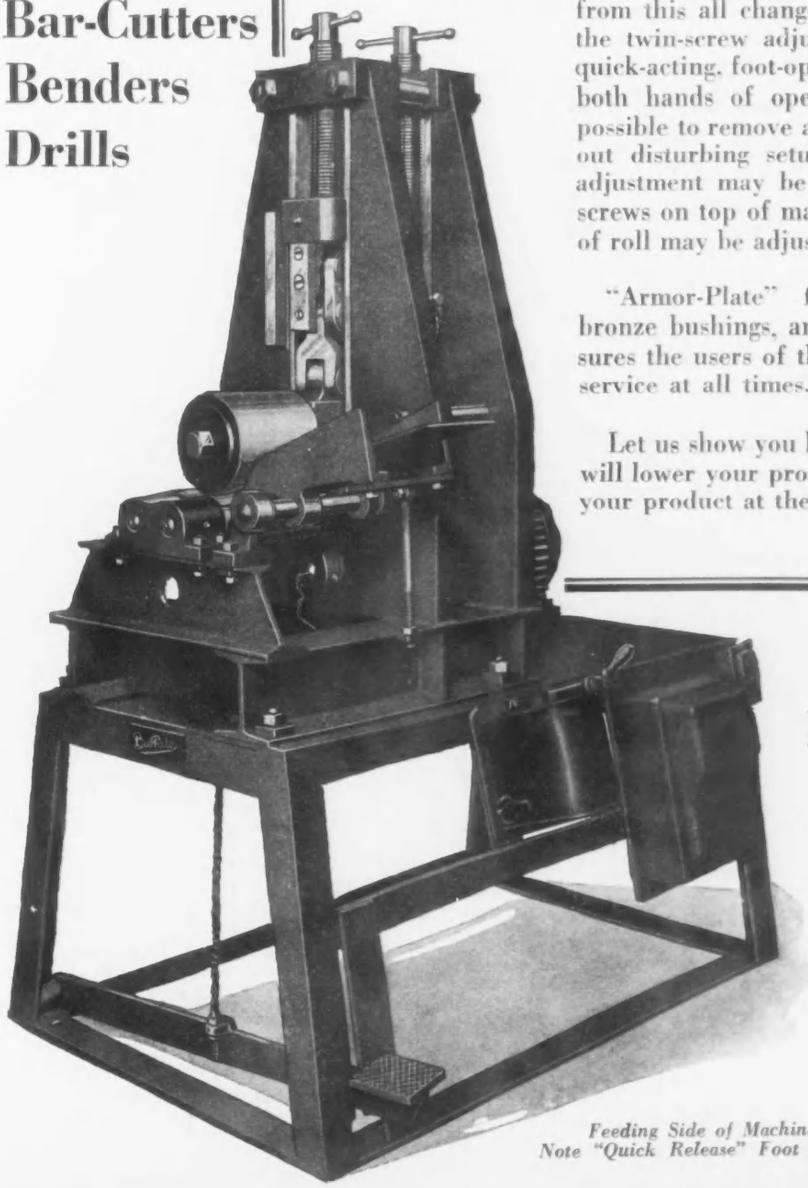

Feeding Side of Machine
Note "Quick Release" Foot Pedal

Buffalo Forge Co.

492 Broadway
Buffalo, N. Y.

In Canada:
Canadian Blower & Forge Co., Ltd.
Kitchener, Ontario

ery. William E. Levis is president of parent organization and subsidiary.

United States Gypsum Co., 300 West Adams Street, Chicago, has awarded general contract to H. K. Ferguson Co., Cleveland, for one-story addition to plant at Warren, Ohio, to cost about $150,000 with machinery. Larger part of unit will be used for manufacture of a patented metal arch.

Lempco Products Co., Dunham Road, Cleveland, manufacturer of automobile axles and kindred steel products, has taken bids for new one-story plant, 70 x 160 ft., to cost close to $100,000 with equipment. Edward G. Hoefler, 5005 Euclid Avenue, is architect.

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Cincinnati

PLANS are under way by Globe-Wernicke Co., Norwood, Cincinnati, manufacturer of filing cabinets, office equipment, etc., for new power plant to cost over $200,000 with equipment. Plant will use pulverized coal as fuel. Kinney & Ehlers, Inc., Dixie Terminal Building, is engineer.

Crosley Radio Corpn., 1329 Arlington Street, Cincinnati, is planning production of other equipment at local plant and will arrange department for manufacture of a new automatic electric ironing machine, including parts and assembling.

Columbus Independent Ice Co., 31 West Mound Street, Columbus, Ohio, has awarded general contract to E. Elford & Son, 555 South Front Street, for one-story artificial ice-manufacturing plant, to cost close to $65,000 with machinery. O. F. Kaiser is one of heads of company.

Power, conveying and other equipment, printing and auxiliary machinery will be installed in new fifteen-story and double basement printing and publishing plant to be erected by *Cincinnati Times-Star*, Sixth and Walnut Streets, Cincinnati, to cost $1,700,000. Bids will be asked on general contract early in June. Samuel Hannaford & Son, Dixie Terminal Building, are architects and engineers.

United States Engineer Office, Memphis, Tenn., will receive bids until June 3 for 650,000 lb. galvanized wire strand, from ½ to ¼-in. diameter.

Board of Education, Springfield, Ohio, contemplates installation of manual training equipment in new junior high school to cost $300,000, for which bids will soon be asked on general contract. Eastman, Budke & Marley, Springfield, are architects. Bids will be asked in June for extensions and alterations in high school on Clifton Avenue to cost over $500,000; installation of manual training facilities is being considered. W. K. Shilling, Springfield, is architect for last noted.

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Gulf States

CONTRACT has been let by Central Power & Light Co., San Antonio, Tex., to Bart Moore Construction Co., San Antonio, for hydroelectric generating plant near Eagle Pass., Tex., including power dam, spillway, etc. Station will take water from irrigation canal being built in Maverick County, and will be equipped for initial capacity of 12,000 hp. Extensions will be made in transmission lines. Project will cost about $1,000,000.

Board of Education, San Antonio, Tex., has asked bids on general contract for two buildings for a vocational high school at Main Avenue and Romana Street, where three existing structures will be remodeled and improved. It will cost about $180,000, of which over $50,000 will be used for tools and equipment. Harvey P. Smith, National Bank of Commerce Building, and Phelps & Dewees, Gunter Building, are architects.

Shearman Concrete Pipe Co., Shreveport, La., has plans for new branch plant for production of cast concrete pipe, to cost close to $25,000 with equipment.

Common Council, Waynesboro, Miss., is planning installation of a municipal electric light and power plant, to cost about $70,000 with equipment.

May Trailers, Inc., 416 North Market Street, Shreveport, La., manufacturer of motor trailers, parts, etc., has secured site at Morgan City, La., through Association of Commerce of that place, for new plant for parts production and assembling, to cost over $30,000 including equipment.

Gulf States Utilities Co., Beaumont, Tex., is disposing of a bond issue of $2,500,000, part of proceeds to be used for extensions and improvements. Company is planning high-tension transmission line to oilfield district at High Island, through Galveston, Chambers and Jefferson Counties, to cost about $90,000. It is an interest of Engineers Public Service Co., operated by Stone & Webster, Inc., 49 Federal Street, Boston.

Southern Airways, Inc., South Loop Road, San Antonio, Tex., is planning erection of hangar, 85 x 100 ft., with repair facilities, at Winburn Field, to cost close to $25,000 with equipment.

Alexandria Culvert Co., Alexandria, La., recently organized with capital of $50,000 to manufacture metal culverts and kindred products, is planning establishment of local plant to cost over $25,000 with equipment. U. B. Evans, Eighth and Scott Streets, heads new company.

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Indiana

EXPANSION and improvements are planned by L. G. S. Devices Corpn., 2571 Cornell Avenue, Indianapolis, manufacturer of steel springs for free wheeling units and other automotive equipment, to double present capacity. An output of 2000 spring units daily is planned. Company is a subsidiary of Cord Corpn., Auburn.

Board of Education, East Chicago, is considering installation of manual training equipment in new two-story and basement Washington high and grade school to cost $350,000, for which plans will be drawn by Karl Norris, Calumet Building, architect.

Johnson Brothers Mfg. Corpn., Shelbyville, recently organized by Elmer and L. V. Johnson, both of Shelbyville, plans operation of local factory for manufacture of gas and oil heaters and circulating systems, and other sheet metal products. Raymond H. Volz, Shelbyville, is interested in new company.

Board of School Commissioners, Knightstown, plans installation of manual training equipment in new two-story and basement high and grade school to cost close to $165,000, for which bids are being asked on general contract until June 2. McGuire & Shook, Knights of Pythias Building, Indianapolis, are architects.

Industrial plants at Anderson are developing increased production schedules. Delco-Remy Corpn., with seven local plants for manufacture of automobile starting and lighting equipment, is running on a capacity basis, giving employment to more than 6000 persons; an overtime night schedule is operative at some of plants. Guide Lamp Corpn., an affiliated organization, manufacturer of automobile lamps, is giving employment to about 1000 operatives, or nearly 400 more than at this time last year. American Steel & Wire Co. is running at close to normal production at local mills for manufacture of wire fencing, welded fabrics, rods, wire nails, etc. Ames Shovel & Tool Co. is showing an improved volume of business and working schedule, as are Howe Fire Apparatus Co. and Anderson Stove Co. plants.

An addition costing about $30,000 will be made to plant of Highland Iron & Steel Co., Terre Haute, work to begin at once. Company has been taking many of its furloughed men back to work and now is operating on an average of five days a week.

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Pacific Coast

BIDS have been asked on general contract by George R. Borrmann Steel Co., Fourth and Grove Streets, Oakland, Cal., for one-story storage and distributing plant, to cost about $35,000 with equipment. H. H. Bolin, Financial Center Building, is architect and engineer.

Board of Education, Pasadena, Cal., has plans for a one-story vocational training shop, 94 x 222 ft., at Pasadena junior college, to cost about $40,000 with equipment. Frederick Kennedy, Jr., 15 South El Molino Street, is architect.

Board of Trustees, Branch Agricultural College, Cedar City, Utah, is planning to rebuild mechanic arts building, recently destroyed by fire, with loss about $35,000 including equipment.

Union Ice Co., 354 Pine Street, San Francisco, has plans for a one-story ice-manufacturing plant at Redwood City, Cal., 100 x 125 ft., to cost over $65,000 with machinery.

Plans have been arranged for merger of Sunset Plumbing Fixtures, Inc., Los Angeles, and West Coast Porcelain Manufacturers, Inc., Millbrae, Cal., manufacturer of sanitary ware. Consolidated company will be capitalized at $2,000,000 and plans general expansion. Adolph Ramish, Los Angeles, will be president and R. C. Troeger, Los Angeles, executive vice-president and secretary.

Publix Garage, Inc., Seattle, care of Schack & Young, Central Building, architects, has awarded general contract to E. S. Booker, 4626 Twenty-first Avenue, N. E., for multi-story automobile service, repair and garage building, to cost about $145,000 with equipment.

Puget Sound Power & Light Co., Seattle, is disposing of a bond issue of $16,000,000, part of proceeds to be used for extensions and improvements in power plants and system, including transmission lines.

Bureau of Yards and Docks, Navy Department, Washington, will receive bids until June 3 for one 250-ton electric stationary hammerhead crane for installation at Puget Sound Navy Yard, Seattle; also for one 10-ton traveling gantry crane with traveling revolving jib, and one 20-ton gasoline-electric traveling tower crane.

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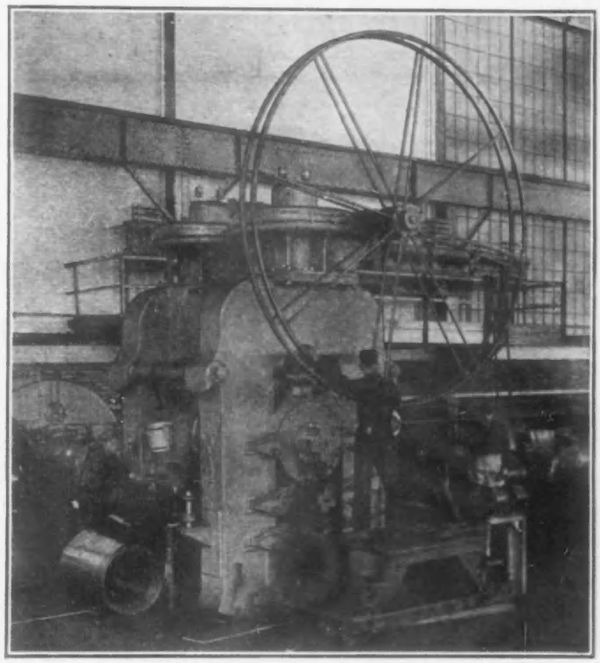

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BLISS

▲ ▲ Business as Others See It

Digest of Current Financial and Economic Opinion ▲ ▲

DISAPPOINTMENT at the postponement of a definite improvement in business conditions features current reviews of the attitude of the "man in the street." And mixed estimates are made of the April and early May movements. One observer warns that "security prices are very prone to overrun the business trend"—at both ends of the scale.

That "business showed no tendency to relinquish gains registered in three consecutive months since the beginning of the year" is contended by the National Industrial Conference Board. April showed better gains than seasonal, in many lines, it is said, and "business conditions . . . continued to furnish no evidence of positive movement either way."

Against this, *Annalist* finds "a receding activity somewhat greater than the normal seasonal decline toward summer." Meanwhile, *Business Week* notes a "continuous, cautious rise of the Federal Reserve Board monthly production volume index since the beginning of the year." And Guaranty Trust Co., New York, finds increases in many lines, in place of the usual seasonal downward tendency.

That bank sees our current extreme weakness in prices as confirming an expectation "that the upward movement of business since the beginning of this year, encouraging as it is, cannot be relied upon to proceed very far or very swiftly in the immediate future."

"Resistance to further business curtailment has petered out. General contraction is again clearly in evidence. Current testimony supports the view that business is still in the last stage of depression, rather than in the first stage of recovery." Thus speaks Alexander Hamilton Institute, which sees no recovery of "normal" before 1932.

But Harvard Economic Society questions this view: "A decrease in business volumes may be registered by complete data for May; but experience shows that early indications often are misleading, and that the nature of the month's movement cannot be determined at this time." That organization looks for a slightly better year for agriculture than 1930 afforded.

Buying Continues Active

Consumer buying is reported by New York *Times* to be "highly selective." But the four-week report [of Woolworth] to May 21 showed sales within 1 per cent of those of a year earlier. This was in spite of lowered prices; and the new mail-order catalogs show average price declines of 14 per cent more. That "automobile manufacture has apparently passed its seasonal crest" is believed by that paper.

Purchasing power is held to have advanced. Midland Bank, Cleveland, puts the April index at 84.6, against 83.9 in March and 79.1 in January. Meanwhile industrial production, which was 82 in December and January, reached 89 in April. "In the first quarter of 1931 payrolls turned up slightly, while the cost of living continued to fall."

Wage scales continue to claim attention. Mr. Schwab, Mr. Farrell, Mr. Green and Mr. Woll have said that they must not be assailed. But *Financial Chronicle* insists that the 1929 agreement made at Mr. Hoover's request was a one-sided affair. "So far as the agreement has actually served to maintain the old level of wages, it has been an obstacle in the path of business recovery, since it has acted directly to prevent that readjustment to the new order of things on the part of labor which is a prime requisite to enduring trade revival. . . . Well-meant efforts intended to arrest the natural course of things constitute drawbacks instead of being helpful in achieving the object sought."

Northwest Chair Co., 22-1 South Tacoma Way, Tacoma, Wash., has plans for a two-story addition, 130 x 135 ft., to cost over $150,000 with equipment. Mock & Morrison, Perkins Building, Tacoma, are architects.

Emeryville High School District, Emeryville, Cal., will take bids at once for one-story manual training shop unit at local schools, to cost about $20,000 with equipment. Samuel Arnold, 3499 San Pablo Avenue, Oakland, Cal., is architect.

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Canada

PUBLIC Utilities Commission, Sault Ste. Marie, Ont., plans alterations and additions to power plant. Four new transformers will be purchased and changes made in switchboard. W. M. Cornell, Queen Street East, is manager.

Canadian Gypsum Co., Ltd., 1221 Bay Street, Toronto, has awarded contract to W. H. Cooper, 42 James Street South, Hamilton, Ont., for a new plant at Willow Grove, Ont., including mill building, sheet rock and crushing buildings, warehouse, etc. J. J. Wagner, R.R. No. 3, Hagersville, Ont., is purchasing agent.

Canadian Bitumuls Co., Ltd., Kent Building, Toronto, has awarded contract to Atwood, Ltd., 660 St. Catharine Street West, Montreal, for a plant on Marien Street, Montreal East, to cost $40,000.

Standard Iron Works, Ltd., 121st Street and 106th Street, Edmonton, Alta., has awarded contract to H. G. MacDonald, Tegler Building, for two plant buildings, to cost $50,000.

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Foreign

NEGOTIATIONS are under way by Ford Motor Co., Dearborn, Mich., for purchase of property at Port Sao Lourenco, Nictheroy, in harbor district of Rio de Janeiro, Brazil, as site for new assembling plant, to cost over $500,000 with equipment.

Ministry of Industry, Nanking, China, is securing Government approval of project for new steel mill and fund of $80,000,000, Chinese currency (about $18,000,000), to carry out project. Plant will be located at Pukow on Yangtse River, opposite Nanking, and will cost $13,000,000, excluding blast furnace of about 500 tons daily capacity to cost $2,250,000. It is proposed to secure coal from mines at Su Hsien, Anhui Province, and to develop such properties and install mining and other machinery will cost $450,000, with branch railroad line to plant site to cost about $225,000.

Officials of Wright's Ropes, Ltd., Birmingham, England, manufacturer of wire rope, cables, etc., have organized Wright's Canadian Ropes, Ltd., to operate as a subsidiary in Canada. New company is acquiring plant of Vancouver Wire Rope Works, Ltd., Industrial Island, Vancouver, B. C., and will begin operations soon. Improvements will be made in present works.

A company is being formed by A. W. Faber and Johann Faber, pencil manufacturers, both with factories at Nuremberg, Germany, with capital of $5,000,000 to take over both plants, as well as factories of Hardtmuths Budweis and allied interests, and consolidate under one management. Johann Faber organization also has plants in Brazil, Poland and Rumania, all given to pencil manufacture, and which will be included in merger. General expansion will be carried out, with establishment of plants in other countries.

Soviet Russian Government, Moscow, Russia, has purchased plant and industrial concession of Swedish Ball & Roller Bearing Co. (SKF), Stockholm, Sweden, at Moscow, and will operate as a Government enterprise. Present works has rated output of 3,000,000 ball and roller bearings a year, which will be considerably increased. Operations for certain period will be under direction of SKF engineers as technical advisers.